

# INCENTIVE STRUCTURE IN PUBLIC DESIGN-BID-BUILD TENDERING AND ITS EFFECTS ON PROJECTS

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## ABSTRACT

Organizational theory argues that the more dynamic and uncertain the environment, the stricter are regulations and organizational structures. Germany's public sector is restricted by tendering regulations resulting in a strict design-bid-build tendering. These legal regulations, as well as contractual penalties, create an incentive structure which often leads to uncooperative behavior of the project partners. This paper identifies the negative incentives of strict design-bid-build tendering and explains their effects on projects. Data was collected from one public authority, and data shows that contractors are selected based on lowest bid. Thus, we argue that this tendering procedure leads to speculative behavior of the contractors, which results in unrealistic cost estimation and an intensified focus on claim management to compensate for below-cost bids. Furthermore, the design-bid-build tendering procedure strictly separates planning and execution phases, resulting in communication barriers between architects and construction companies. With regard to the non-collaborative up to hostile behavior three current public mega projects in Germany will be reviewed in brief, and of these the project Elbphilharmonie Hamburg will be discussed in more depth based on the tendering procedure and the contractual situation. We conclude that due to increasing uncertainty and complexity in projects, as well as the way of interaction between the project parties, that the current tendering procedure and the form of contracts impede collaboration. Therefore, incentives are needed which foster the collaboration in public projects.

## KEYWORDS

Contract, collaboration, incentives, tendering, relational, transactional.

## INTRODUCTION

A contract is necessary to create a framework in which the project will be delivered successfully by coordinating and organizing processes and project participants (Smith and Rybkowski 2012). Generally a contract consists of positive and negative incentives, also named incentives and disincentives, like bonus-malus regulations or information access. Therefore the contract itself can be understood as an incentive system (Schöttle and Gehbauer 2012). The contract can be designed ranging from

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pure transactional to pure relational including combinations of both. Transactional contracts define the discrete transaction between the contractual partners and therefore are widely specified and detailed to protect against all kinds of eventualities. In contrast relational contracts are “incompleted” (Cullen and Hickmann 2012). They define the relationship between the contractual partners. According to Lichtig (2005), for complex projects it is important to build a sustainable collaboration between the participants based on agreements enabling them to understand and solve problems; consequently, relational contracts are necessary.

Traditionally, the selection of the building contractor starts with a bid-build tendering procedure ending up in a transactional contract. Rooke et al. (2004) identify three kinds of pressure in the public sector of the UK influencing the tendering procedure: pressure of accepting the lowest tender, time pressure in terms of inflexible budgetary arrangements, and pressure from the stakeholders. These kinds of pressure exist in a strict design-bid-build tendering and influence the design of the contract. Thus, this paper indicates a correlation between cooperative behavior of the project participants and the tendering procedure as well as the contractual structure. By analyzing eight tendering procedures, it will be demonstrated that speculations arise from this tendering procedure. The key conflict, arising from the public authorities’ aim to go for the lowest bid and the tenderers’ aim of profit maximization, sets negative incentives for the collaboration influencing the project success.

## **COLLECTED DATA OF BID -BUILD TENDERING PROCEDURES**

In Germany public projects are strictly regulated<sup>3</sup> in terms of the tendering procedure. The public client has to select the most economical bid, but in fact, in almost all tendering procedures critical factors like quality or environmental compatibility are not considered. The principle factor for selection is the bid sum. Deciding the tendering process according to the lump or bid sum is simple and easy to understand. The problem with the named factors is the wide range of interpretation. Bidders could make use of the option to contest the tendering procedure, because of unclear meaning. For project realization this means risk in terms of delay, due to legal action taken by the bidder, which in turn leads to additional costs prior to construction. Underbidding in order to winning the tendering procedure and achieving the break even or maximizing the profit is an ongoing process. Unfortunately, there exists no empiric data about the level of speculations included in the bids. Therefore, evaluation of this issue is difficult.

In order to get an impression of tendering procedures a preliminary study was conducted at one building authority. Figure 1 presents the collected data of eight open tendering procedures out of three infrastructure projects. Project 1 and 3 consist of only one tendering procedure, project 2 consists of six tendering procedures. In all tendering procedures the tenders were selected based on price. Merely, in project 1 the tender was rated 90 % on price and 10 % on technical aspects. While every bidder was rated with the full score in technical aspects (construction method, construction process, and quality assurance) only the price was the selection factor.

The blue colored bar in figure 1 shows the relative range of the bid sum of each tendering procedure. The relative range is derived from the difference between

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<sup>3</sup> For further information see German construction contract procedure (VOB).

highest and lowest bid in reference to the lowest bid. For example, in tendering procedure of project 2C the highest bid is 42 % higher than the lowest bid at an overall arithmetic mean of about 17 %. The dark green colored bar presents the relative range of the bid sum excluding the lowest bid. For the chosen example the relative range excluding the lowest bid is 27 %. By comparing both bars, it can be said that the lowest bid differs widely compared to the second bid. The lime green colored bar presents the relative range of the bid sum excluding the lowest and the highest bid. Relating to project 2C, the bid sums of the second and third tender differ by 2 %. Thus, figure 1 illustrates clearly that the differences between relative range of bid sums and the relative ranges of bid sums excluding bids are significant. This indicates a speculative behavior of some tenderers. To generalize the statement, more data from different building authorities needs to be collected and compared.

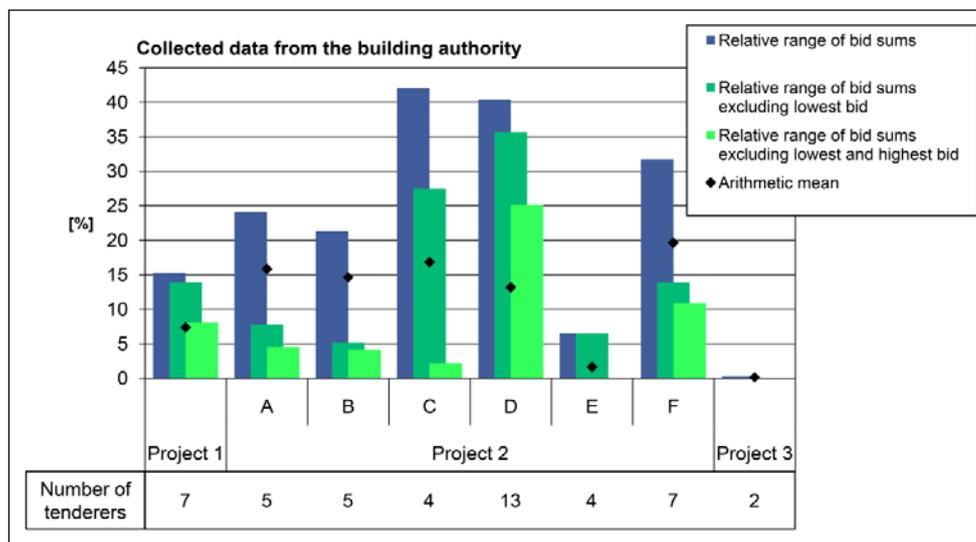


Figure 1: Relative ranges of bid sums

Another indicator of speculative bidding behavior can be formulated over the difference between submitted and approved claims. Rooke et al. (2004) classify claims in proactive and reactive claims. Proactive claims are those which the tenderer plans at tender stage and reactive claims are those, which are developed during implementation of the project. Thus, proactive claims are speculative and can be identified analyzing the structure of claims. The culture of the construction industry in Germany is a “culture of claims”. The preliminary study shows a tendency of speculative behavior, because there is a difference between submitted and approved claim. Until now it is not possible to make a clear statement, since more data is necessary to verify these findings. Nevertheless, it can be argued that the competitive tendering procedure leads to uncooperative behavior resulting in speculative bids and intensive claim management.

## PUBLIC MEGA PROJECTS IN GERMANY

Currently, there are several public mega projects underway in Germany. Three of these mega projects are discussed intensively by the public. These are, the concert hall Elbphilharmonie in Hamburg, the new Berlin Brandenburg International Airport

(BER), and Stuttgart 21 (S21) a railway project including new railway tracks and the modification of Stuttgart's central station. At all projects the tendering procedure is bid-build and contracts are transactional. Table 1 provides an overview of the estimated and current situation based on cost and completion date according to the information provided by German Taxpayers Association (2013).

Table 1: Cost and time overview of three mega projects

	<b>Elbphilharmonie<sup>4</sup></b>	<b>BER</b>	<b>S21</b>
Kind of tendering procedure	Public private partnership (PPP) with a general contractor	Planned as PPP, then divided into several operations resulting in many tendering procedures	Many tendering procedures based on sections and operations
Original cost estimation	EUR 77 million (2005)	EUR 1.7 billion (2004)	EUR 2.45 billion (1995)
Current cost estimation (March 2013)	EUR 575 million	EUR 4.3 billion	EUR 6.8 billion
Cost increase	646.8 %	152.9 %	177.6 %
Original completion date	March 2010	June 2012	2019
Current completion date	June 2016	open	2022

It is obvious that the cost overruns are extreme, especially at the Elbphilharmonie project. The delivery of this project is anticipated with a delay of 75 months at a planned construction period of 36 months and increased costs of 646.8 %. The gap between estimated and final cost is essential. As Flyvbjerg et al. (2003) stated cost estimation is not trustful, and thus, needs to be seen critically.

By comparing the project data collected from the daily press till now the following problems become obvious: high complexity, unclear responsibilities, changeovers of responsibilities inside the public authority, decision made due to political reasons, Board of Directors with knowledge gaps, public authority ignoring warnings of experts, changes in design, ineffective communication, non-transparency-policy, lots of survey reports and legal proceedings, unrealistic cost estimation, costs overruns, and delay in construction (being behind schedule). Focusing on the project structure of the concert hall Elbphilharmonie in Hamburg, we analyze the current situation in detail.

## **ELBPILHARMONIE HAMBURG**

The public pressure for the project is increasing, because of growing costs and postponing the opening. Therefore, Hamburg's public authority published the contracts as well as referring documents and minutes from the federal state government. By analyzing these documents the tendering procedure and the contractual situation is described and accompanying problems are identified.

<sup>4</sup> Cost estimation relates only to the amount of the public client.

## **THE ELBPILHARMONIE PROJECT**

In 2001 Alexander Gérard and Jana Marko<sup>5</sup> came up with the idea of building a philharmonic on top of the historical warehouse “Kaiserspeicher A”<sup>6</sup> (see figure 2). Together with the developer Dieter Becken they retained the architects Herzog & de Meuron with the design. The design and the financial concept were presented to Hamburg’s federal state government in 2003.



Figure 2: Construction site Elbphilharmonie (Thies Rätzke, May 2012)

The complex will include three concert halls, a hotel, 45 private apartments, restaurants and bars as well as a 4,000 m<sup>2</sup> of public plaza in between the old and the new building. Due to soundproofing reasons, the concert hall is decoupled at a height of 50 meters. Kaiserspeicher A predominantly will be used as parking area (Press information 2013).

## **TENDERING PROCEDURE**

In the course of project realization a private investor was selected in a Europe-wide tendering process in order to build a public private partnership. In April 2006 after the preferred-bidder decision was chosen, STRABAG Projektentwicklungs GmbH and IQ<sup>2</sup> (HOCHTIEF and CommerzReal AG)<sup>7</sup> participated in the negotiation process. Almost at the same time, in May 2006, the general planner (Herzog & de Meuron and Höhler + Partner) requested additional six months to detail the plans. Furthermore, he warned the public client that the tendering procedure is conducted too early. In return, the public client argues that the building prices will increase by waiting. At a later stage it was found out that there were also political reasons that influenced the

<sup>5</sup> Gérard and Becken want to build a Joint-Venture with the Free and Hanseatic City of Hamburg (FHH) sharing opportunity and risk. Because of differences of opinion FHH decided to realize the project on its own. FHH did not use the knowledge and experience of the developer as required.

<sup>6</sup> Built 1875 the warehouse was partially destroyed during World War II. In 1963 the old warehouse was dismantled and a new warehouse was built in 1966, Kaiserspeicher A. Until the 90’s cocoa, coffee and tobacco were stored in the warehouse.

<sup>7</sup> IQ<sup>2</sup> is a bidding consortium consisting of CommerzReal AG and HOCHTIEF Solution AG, later named ADMANTA.

decision (PUA 2011). During the four month negotiation process the realization of the project was discussed with both bidders and they were requested to hand in the offer not later than September 15<sup>th</sup>, 2006. Shortly before the deadline was reached STRABAG contested the procedure, reasoning that they cannot calculate based on the early planning stage and the inadequate technical specifications. On November 28<sup>th</sup>, 2006, STRABAG abounded the appeal (PUA 2011). The minutes of the meeting of the Parliament of the Free and Hanseatic City of Hamburg (FHH) from August 24<sup>th</sup>, 2011, shows that STRABAG withdrew their complaint, while the city of Hamburg was checking other possibilities of cooperation. Furthermore, it can be read from the document “if FHH and STRABAG will be not cooperating within a year with an adequate amount, STRABAG can charge the city in one’s sole discretion for nearly two years of negotiation procedure Elbphilharmonie for the costs incurred at a lump sum of EUR 3 million” (Bürgschaft FHH 2011). Thus, STRABAG bowed out of the competition and IQ<sup>2</sup> was accepted after reducing the bid sum from EUR 274.4 million<sup>8</sup> to EUR 241.3 million. The amount of investment for FHH was estimated with EUR 77 million in 2005 (Senat FHH 2005) and at the tendering procedure with a total of EUR 142.2 million. While EUR 57.5 million were financed by donations, the investment of the public client amounted to EUR 84.7 million (Senat FHH 2006). By the fixed price contract the public client intended to shift the risk to the contractor.

#### **CONTRACT AND PROJECT STRUCTURE**

During the contracting process ADMANTA emerged out of IQ<sup>2</sup> and commissioned HOCHTIEF Solution AG as general contractor (see figure 3). Simultaneous with the start of the construction work, problems occurred due to unfinished and changing design plans. The public client was responsible to deliver detailed plans from the general planner to ADMANTA. Once the public client could not deliver ADMANTA directly started the claim process. Moreover, some parts of the detailed planning process were in the hand of the general planner and others were in the hand of HOCHTIEF. While both planning processes are highly depended on each other, the stakeholders were not linked to each other. This caused even further problems had another negative impact on the project outcome. Figure 3 shows the project structure in viewing the contractual links between the stakeholders. Apparently every stakeholder is linked to the public client by transactional contracts only. The contract between public client and ADMANTA includes a turnkey handover as well as the provision of public services for 20 years. At the beginning of the tendering the public client thought about integrating a bonus-malus regulation into the contract, but finally they did not integrate this kind of system (PUA 2011, Senat FHH 2007).

As contractor ADMANTA was in the position to claim each of the plans that were not delivered on time. In consequence, a mass of notifications and an intensive claim management emerged. For example, by September 2008 ADMANTA handed in 226 notifications resulting in a total claim sum of EUR 250 million. The public client had the opinion that ADMANTA was not allowed to do so, but the legal advice clarified and pointed out that ADMANTA was right. Hence, it can be derived that the public client did not know about all the consequences of their own contracts and therefore

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<sup>8</sup> This bid sum was assessed as inefficient.

was not aware of the risk involved. At the end of November 2008 both parties agreed that the public client will pay EUR 137 million to ADMANTA including all outstanding requirements, if ADMANTA accepts the new defined construction target. At the end of this negotiation process the senate stated: “the senate is firmly convinced that the new schedule [final delivery by November 30<sup>th</sup>, 2011] is fully reliable and contains no recognizable risk anymore” (Senat FHH 2008). Two years later 139 new notifications accrued. To understand the problems of the project the city parliament established a board of inquiry to analyze the whole situation.

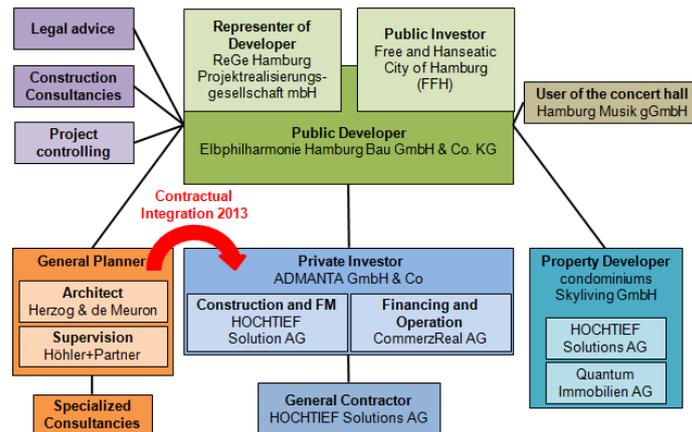


Figure 3: Project organization Elbphilharmonie (based on PUA 2011)

Another conflict arose with regard to the stability of the roof. HOCHTIEF was concerned about the bearing capacity and therefore stopped lowering the roof. HOCHTIEF intended to strengthen the roof, which would lead to extra costs. The public client preferred to build it as originally planned. Both parties argued against each other using expert opinions. The public client threatens with termination of the contract. As a result the construction site was frozen in for a period of one year. At the end of November 2012 the conflict was resolved by agreement and HOCHTIEF started lowering the roof as originally planned.

By analyzing contracts and minutes of meetings the following problems occurred due to the contract and project structure:

- Unclear contractual arrangement.
- Premature tendering process.
- Strict separation between design and construction process.
- The splitting of the detailed planning results in high dependency between general planner and general contractor.
- Non integration of the investor plans as well as the integration of the user requirements.
- Missing commitments between the stakeholders.
- Missing competence and knowledge in the field of technical construction expertise on public client side.

- Transferring risk from the public client to the contractor.

### **REORGANIZATION CONTRACT**

In February 2013 a negotiation between the partners set new conditions. In the new reorganization contract ADMANTA guaranteed that the concert hall of the Elbphilharmonie will be finished by June 30<sup>th</sup>, 2016 and that the rest will be handed over to the client by October 31<sup>st</sup>, 2016. Thus, the project will be finished with a total delay of seven years. With the new contract HOCHTIEF agreed to take over all design and construction related risks and to observe the quality requirements. This means that HOCHTIEF is now responsible for the design process (see figure 3). Owing to this fact, Herzog & de Meuron, Höhler + Partner, and HOCHTIEF are now a consortium. Furthermore, HOCHTIEF commits to implement the acoustics specifications of the acoustician Yasuhisa Toyota, which they had criticized and questioned before.

Besides all this, the new reorganization gives the public client the special right to cancel the contract if ADMANTA misses contracted-fixed deadlines. In addition to the cancelation condition in terms of the missing of deadlines the parties agreed on a penalty fee for the contractor of EUR 575,000 per working day up to EUR 28.75 million in total. To make sure that the project design is in quality and functional capability, both parties charge surveyors together. Finally, ADMANTA will receive a total lump-sum of EUR 575 million (Neuordnungsvereinbarung 2013).

From the above, it can be stated that the public client is learning from the project and tries to turnaround the situation via a reorganization contract. The reorganization contract is still a transactional contract containing some elements of a relational contract. For example, the general contractor and general planner are now a consortium and the relationship is contractual defined. Additionally the contract schedules a monthly meeting between the management board of public client and private partner, as well as the project manager HOCHTIEF, representatives of Herzog & de Meuron, and the processing managers involved (Neuordnungsvereinbarung 2013). Nevertheless, even though the responsibility of the planning process was firstly in the hand of the public client, every risk is now shifted to the contractor. ADMANTA has to bear all the risk, while the public client is not liable anymore. Thus, collaboration does not exist, since there is no “change in the way work is done” (Zimina et al. 2012) by project participants.

By reviewing the new contractual conditions, one major question arises and therefore needs to be asked: How can a public client and a general contractor work together cooperatively, as the new contract is build from penalties?

### **EFFECTS ON COLLABORATION**

In consequence of the tendering procedure, the contracts, and the project structure, the progress of the project depends extensively on the decision and responsibility of the public client. The problems named above affects the project as follows:

- Many technical and conceptual changes.
- Multi-calculations of structural analysis.
- Communication and coordination problems between project parties.

- No corporate strategy between the stakeholders.
- No commitment, only local optimization.
- No cost transparency.
- No aligned time schedule between general planner and general contractor.
- Poor risk management based on poor consulting service in terms of risk identification and rating from external consultancies.
- Poor performance.

Thus, the tendering procedure itself sets negative incentives. The pure transactional contract structure, the lag of knowledge as well as the project experience of the stakeholders in general, especially in context of profit maximization, leads to an uncooperative behavior. Moreover the disincentives establish an inflexible framework, where uncoordinated dependency between the parties occurs.

## CONCLUSION

This paper identified negative effects of the public design-bid-build tendering in Germany. It can be stated that the design-bid-build tendering procedure set negative incentives which leads to uncooperative behavior and non-collaboration. Findings from collected data and from the case study show that the contractual system needs to be changed from transactional to a more relational contract. Therefore, the selection of the contractor needs to be modified in the way that not the lowest bid wins the bidding competition in order to counter speculations. Figure 4 illustrates the need for changing from currently pure transactional contracts to more relational contracts.

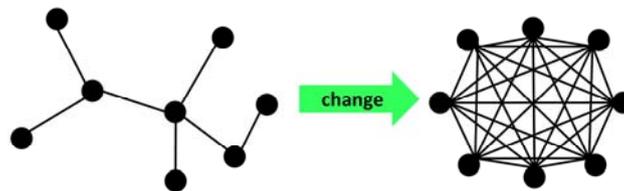


Figure 4: Changing from transactional to relational contract

In transactional contracts not all project stakeholders are legally connected with each other in a direct way. The missing connections lead to poor communication and poor coordination resulting in unsuccessful project delivery. As projects in other countries show, relational contracts support collaboration between the project partners (Lichtig 2005). The system needs to be changed to a collaborative approach like integrated project delivery (IPD) to optimize the delivery of the project (Thomsen et al. 2010). Relational contracts like the Project Alliance Agreement (PAA) or Integrated Form of Agreements (IFOA) help to create a framework where only cooperative behavior works (Darrington and Howell 2010). This in turn calls for a different tendering procedure. In compliance with Heidemann and Gehbauer (2010) the VOB “needs to allow new award procedures which allow a selection of the contract partner by [...] competence [...], the ability to use lean methods and their willingness to bring innovation into the project”. Thus, contracts need to be more flexible in order to dynamic and uncertain processes. At the moment the resistance against a cultural

change in Germany's construction industry is very high. People are quite reluctant with regard to the implementation of new strategies and processes. To change the construction industry incentives needs to be set, which support the collaboration. Therefore, more research is needed in the field of behavioral science related to project participants to better understand the resistance to move.

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