Applied Laser Technology
Vol. 29, No.1, (2022), pp. 26-32

German infrastructure projects financed by the government that use contractors expertise

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Abstract

Public works planning and construction are often considered separate activities in Germany. During the design phase, the client and designer collaborate to develop a strategy for carrying out the project. The construction itself will be carried out by one or more contractors after the design phase. The ineffective transfer of data between the planning and construction phases is evident in German building projects. Contractor input might be useful throughout the theoretical planning stages of the design process. Both the time and money needed to complete a project can wind up going over budget because of poor planning that occurred during the design phase. Consequently, using the contractor's expertise throughout the design phase may lead to a variety of advantages, such as a shorter project duration. Using execution skills on publicly financed infrastructure projects is something Germany might do in four ways that we'll examine in this essay.

Introduction

With demand on the rise, construction projects, especially those involving public works, are becoming more complicated. From what I can see, this is pretty much the case all around the world. Significant schedule and budget overruns are commonplace in such projects. Both the customer and the contractor do not cooperate at the end of the project, and they also do not work together well while the project is being carried out (Black et al., 2000). Based on what Ingram and Bennett (1997), Girmscheid (2005), and Spang (2009) have said, the following facts show the typical situation in the German and global construction and plant market:

The "lowest price-principle" has led to many negative outcomes, including data loss, higher expenses for claims and counterclaims management, an increase in the overall number of conflicts, damaged relationships between clients and service providers, and dissatisfied consumers. • The contractor industry is notorious for its high failure rate and poor return rate. Consequently, professionals started looking at other ways of completing projects. The unsatisfactory state of affairs was investigated by Latham (1994), one of the first publications to do so. In his research, he advocates reevaluating the client-contractor dynamic and modifying the bidding process to remove pricing as the only criterion for contractor evaluation. Quantitative and qualitative criteria should be considered together to identify the most suitable contractor. In addition, Latham suggests a less adversarial approach to project management, one that is more conducive to cooperation and win-win scenarios. Egan (1998), writing four years after the study's release, suggested incorporating successful strategies from other industries into the construction industry to improve operations utilising the results of this and similar research. It is essential that the contractor and the customer work towards the same goal. According to Sakal (2005), conventional wisdom about project management often falls short when it comes to large, complex infrastructure projects. Researchers have come up with new techniques to address the shortcomings of the previous methods and provide better outcomes for the project's client and contractor based on these early investigations. One novel strategy is described in depth in the next chapter: using the contractor's knowledge and experience in the early phases of project planning. The commercial sector in Germany and elsewhere makes extensive use of it. Bringing in the contractor early on in the planning process improves budget and timeline predictability, leads to a higher

ISSN: 1000-372X ALT

contractually agreed score, a deeper awareness of risk, and smoother transitions from design to execution. In the business world, it is helpful to make advantage of contractors' expertise. However, strict government laws prevent its usage in the public sector. This study will examine the limits imposed by the law. The contractor's expertise will be used as early in the planning process as feasible using the models developed from this data.

Research Design

To provide the groundwork for the project, a literature evaluation is necessary. The models were analysed with the help of the contractors' experience. Researchers were interested in all kinds of construction projects, not only infrastructure ones, at this stage of the study. Other cultural methods were also studied. Despite the fact that different countries' legal regimes provide different ways to use the contractors' data, every model that is examined might offer research and, in the end, the German model, some useful ideas. The results of the literature review informed the development of a field research to get a better understanding of the perspectives of construction industry experts about the utilisation of contractors' knowledge. At several points in the design process, we were interested in hearing their thoughts on incorporating contractor knowledge. Third, there has to be a variety of plans for how contractors might be integrated into publicly financed infrastructure projects in Germany.

Basics for using contractor's knowledge

There are two primary ways in which the contractor's expertise might be put to use:

Therefore, the two scenarios must be differentiated in order to create a model for Germany. In both circumstances, the contractor is brought in before the actual work begins, at a time when his insights may do the most good. The next chapter will also demonstrate the underlying legal distinctions between these two options, which contribute to this differentiation.

The German Design Method

The modern planning method will be described first, so that the context of the study project in Germany may be grasped and its purpose made clear. As illustrated in table 1, there are five main stages to this procedure. Following the planning stage come the tendering phase, the actual bidding procedure, and finally the building stage.

Traditional roles and the stages of planning are outlined in Table 1.

Planning step	Responsibility
Preliminary assessment	Client
Conceptual design	Client
Basic engineering	Client
Approval planning	Client
Detail engineering	Client / contractor

Typically, the customer or an expert hired by the client handles all of the planning, leaving the contractor free to concentrate on building. Clients seldom have the contractor take on the task of detail engineering.

Parts of the project's intricate engineering (such the engineering buildings) might be included here.

The customer is still responsible for the remainder of the detail engineering, such as for the track. Planning for permission is another major consideration. The planning approval process is included in this. In other words, this is a particularly German-specific practice. Everyone who stands to lose or gain from the initiative needs to have their voices heard. It is necessary to weigh all of their concerns. Approval of the idea is unlikely until all concerns are addressed. However, impacted parties still have the right to file a lawsuit within a certain time frame following the approval decision if they have complaints that were overlooked. Due to the many parties involved, this procedure might drag on for months, if not years, before a final, binding judgment is reached.

The Value of the Contractor's Expertise, Section

Several variations of ECI are in widespread usage around the globe. It may take the shape of various cooperation arrangements or, at its simplest, early contractor involvement in the project. In the 1990s, the UK deployed ECI for the first time in the Andrew Project (Rooney, 2006). It originated from the need for expertise in carrying out a massive undertaking.

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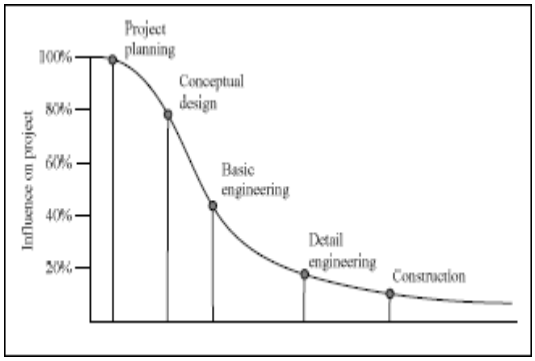
Ever since ECI was introduced in 2005, Australia has also embraced it (Swainston, 2006). One such use is Alliance contracting, which is the 'pure' form (Ross, 2009). A significant advantage of ECI is the ability to include the knowledge and experience of the contractor or construction business into the project planning process. Previous examples shown that in traditional project delivery models, the design is typically completed by the client or by an engineer or consultant assigned by the client. The contractors' execution experience is seldom taken into account, which is a big negative. Engineers and architects may have a deep grasp of the technical aspects of a project, but they can't compare to contractors when it comes to actually getting the work done. As a consequence, the designers don't have enough information to improve future projects. Here is where the contractor's knowledge and experience might be invaluable. Making sure everything goes according to plan could be useful at the design stage (Gil et al., 2000). By analysing the punctuality of Saudi Arabian building projects, Assaf and Al-Hejji (2006) proved the importance of the design phase. The survey was filled out by fifteen clients and fifteen consultants and contractors. In their planning phase, Assaf and AL-Hejji recognised the following factors as possible causes of project duration: Design documents with mistakes and missing information

• Design documentation creation delays Here are some reasons why: • Sketches that are incorrect or ambiguous Creating a project that is too complicated • A miscommunication between the design engineer and the owner -The design team members do not possess the necessary competence. In many cases, they found that ECI may even abolish these effects altogether. There is an added bonus of improved constructability when the contractor's execution knowledge is included into the design phase (Proverbs & Holt, 2000). There will be significant savings in both time and money over the long run. According to Gottlieb and Jensen (2011) and Bourn (2001), it's feasible to reduce expenses by up to one third. As stated by Chan et al. (2005), Spending as little as 7% less time and as much as 40% less money on infrastructure upgrades is possible.

Figure 1 shows the project's effect at different stages of planning and construction. Conceptual design is one of the first stages of the design process, and it allows for over 80% of the project's potential modifications, compared to the approximately 10% that may be changed after construction. This diminishing possibility for stakeholders to have an influence is explained by the substance of the different design phases. In the first phases of road planning, the route has to be determined. The number of tunnels to include into the route is one example of a decision that may have a significant impact on the overall cost of the project. In the latter phases of design, there are only a handful of little decisions to make, and they all have a very little effect on the overall budget for the project.



Impact on the Project, Figure 1 (Scott, 2001).

Making adjustments early in a project's development is not only simpler, but also more cost-effective. As the design progresses, the adjustments become more labor intensive due to the need of altering or redoing various components of the final product. In the worst-case scenario, some adjustments cannot be made because, for instance, they need substantial alterations to the design, and the effort required to alter the plans outweighs the benefits. It's not only the customers that benefit from the ECI approach. If contractors are hired for both the planning and the building phases, they may reap the benefits of their early participation in the design process. Contractors have a limited amount of time in conventionally bid projects to read the materials, plan how to construct it, and identify risks and uncertainties. They learn the ins and outs of the project from the ground up by taking part in its design. This will help them avoid

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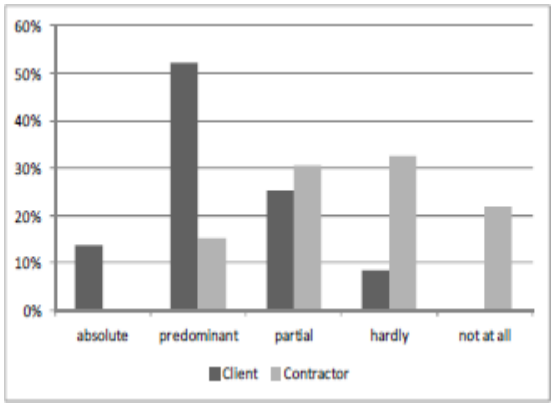
overlooking any potential construction-related issues. One of the questions asked in a field research done by the chair of Project Management in 2006 was, "How obvious are risks in the tender documents?" (Figure 2). A total of 126 professionals (57 clients, 54 contractors, and 15 intervenors) took part in the research. Risks are either completely or overwhelmingly clear from the tender materials, as stated by over 60% of respondents. However, just 15% of the contractors shared this view. While 8 percent of customers agree with contractors' assessment that risks are not made clear in bidding papers, 55 percent of contractors say the opposite. When the contractor is part of the design process, he learns about potential problems ahead of time. This will allow him to plan for how to deal with them and make a more prudent offer to you.



Risks that are readily apparent in the tender materials are shown in Figure 2 (Spang et al., 2009).

Having an open dialogue about potential dangers may help keep construction sites peaceful. Conflicts might also emerge for other reasons, such as a disagreement about the scope of the agreement (Figure 3).

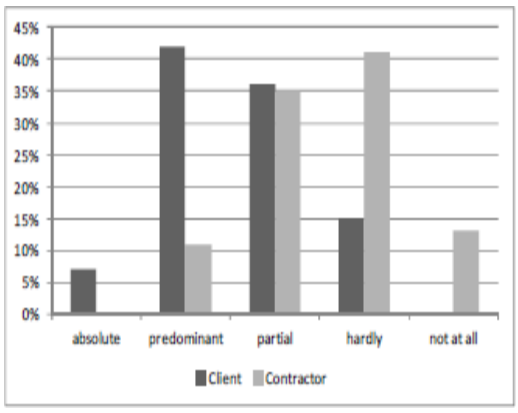


Figure 3: Clarity of the Agreed-Upon Scope (Spang et al., 2009).

When asked about the clarity of the contractually agreed scope, 49% of customers said it was at least mostly apparent, but just 12% of contractors concurred. 54% of contractors said there is little to no clarity on the agreed-upon scope of work. This is a common source of tension between the client and the contractor, and may even result in legal action. Using the contractor's expertise would help the project avoid these planning flaws and improve the quality of the work as a whole.

As a whole, ECI has the following advantages (Riemann & Spang, 2012):

Utilization of contractor expertise Improved communication between design and construction phases Clearer awareness of risks Enhanced constructability Greater overall project performance

Challenges to ECI in Germany

In Germany's private sector, early contractor participation is on the rise. The reason it isn't employed in the public sector is because the latter is subject to different rules. These include the need for an open system for bidding, the budget legislation, the encouragement of small and medium-sized businesses, and the idea of equal treatment or opportunity for all bidders. As a whole, they make it more difficult to import many successful foreign practices. The legislation in the United States and Europe both contribute to these stringent guidelines. Also, they had to cope with them when implementing "Best Value Procurement in the Netherlands" (Kashiwagi, 2011; van Leeuwen, 2011). Instead of an open bidding process, "competitive dialogue" might be used to include the contractor in the planning stage. Unless exempted by particular restrictions, all public projects in Germany must be offered through

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the open method. These are demanding prerequisites. It is necessary to identify the project that satisfies these requirements. One necessary but difficult-to-prove requirement is, for instance, that the public customer is unable to articulate the contractually agreed scope. However, even if a project seems to satisfy these characteristics, there may still be barriers to adoption on the part of the customer and the contractor. To begin, it's important to note that the CD is a lengthy process that needs significant investment from the customer and the bids. The customer would likely incur more financial burdens as a result of the bidding process. These expenses originate from two sources: his time and the cash made to the bidders. In turn, the bids may incur expenses if the customer only covers a portion of their work. These further expenditures should be covered by a skillfully optimized project by the contractor. Also, unlike the open process, which is well established and well recognized, the jurisdiction around the competitive dialogue is still developing. This presents opportunities for both customers and contractors but also has certain dangers.

Methods for making the most of contractors' expertise on publicly funded German infrastructure projects

You may have the most influence on the project's budget and outcome during the early stages, as shown in Figure 1. Although it is preferable to include the contractor early on in the planning phase, it is still wise to acquire their thoughts on the planned work from construction companies as soon as possible. Several suggestions for Germany have emerged from the field study and global literature review. If you want to take use of contractors' knowledge and experience, one option is to work with them after the conceptual design process is over but before the plans are submitted for approval. Since the project has not been officially approved yet, contractors are free to suggest ways to save costs without changing the approved plan. If this request were to be made at a later stage, the planning for the modification would have to begin over. The project owner (client) needs to schedule contractor-only workshops to discuss optimisation possibilities. Treating following bids properly is a prerequisite of this strategy. It is against the law in Germany to provide an advantage to a particular bidder. Everyone else who may place a bid must likewise be supplied with the data given to the victor. This is why it's crucial that the client provide written information about the project. All possible bidders will have access to the same information if he does this. If other bidders arise throughout the bidding process who were not engaged in the conceptual design phase, clients are welcome to share the same material with them. Actually, the bid package should also include these facts. Allowing bidders to present other ideas throughout the bidding process is another way to use the contractor's knowledge. These days, a lot of government agencies aren't keen on looking at competing bids, even if doing so may save expenses, improve quality, or shorten the duration of a project without raising prices. Clients adopt this measure because they are worried that unsuccessful bids may sue. Potential investors have offered recommendations that may enhance their projects, but they have turned down the chance to do so. The fact that there are several alternatives raises the possibility of unjust treatment of the bidders, which might lead to disagreements. An failed bidder's lawsuit might put an immediate stop to the bidding process. If he succeeds in court, the already drawn-out bidding procedure will have to be restarted from the beginning. Both the client and the contractor should think about how they handle different options in the future. A high level of tendering can only be ensured by following a well-organised process. More specifically, the rules for proposing other ideas need to be defined. For example, it is the client's responsibility to specify the absolute minimum that is required. Furthermore, contractors are expected to consistently vary their work. Time, money, quality, and customer happiness are four metrics that customers might aim to enhance by using the contractor's skills. On the other hand, contractors who are unsuccessful might think about suing even if they have little chance of prevailing. Contractors would benefit in many ways from this as it would encourage consumers to try out new, collaborative bidding strategies. There is a third chance to take use of the contractor's knowledge and experience during the tendering process. Most of Germany's publicly financed civil infrastructure projects employ the open approach for bidding, as mentioned before. The open method does not allow for any improvement, even in the event that an alternative solution is proposed (and then vetoed). Due to the contractor's extensive experience in

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tendering processes in a competitive conversation is a more promising option. In this way, the contractor might contribute his expertise by carrying out the very last stages of preparation. The procedure's benefit lies in the fact that competing bids are incentivized to improve the project before the contract is finalized. The fact that this method can't be used on every project is a drawback. The difficulty of the project is only one of several criteria that must be met. Public customers are obligated to utilize the transparent process whenever possible. This approach incorporates the contractor's expertise late in the planning stage.

Conclusion

The expertise of the contractor is currently underutilized in Germany's publicly funded infrastructure projects. In the open system for tendering, the most common criterion for selecting a contractor is cost. After signing a contract, they have no incentive to send in more information than is necessary. The ideal course of action for a project is to include the contractor (or construction business) as early as possible into the planning process so that his expertise may be used. Several methods for carrying out German infrastructure projects were outlined in this report. The options span from holding a workshop with potential contractors at an early stage of the project (if a full involvement in the planning is not feasible) to using the contractor's knowledge at the end of the planning phase (through various approaches) to using the contractor's knowledge after contract close (through a solution) during the execution phase. The opportunities offered for Germany are baby steps, or little pieces of globally utilized methods like Alliance Contracting in Australia. As a result, these models are applicable in these regions, but in Germany, they would need substantial revisions before being put into use.
In light of the present legislative environment in Germany, a Research Project at the Chair of Project Management is doing a more in-depth investigation of these options, how they may operate, and whether or not they are all adaptable in publicly funded infrastructure projects in Germany.

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