

## **APPLICATION OF PROJECT MANAGEMENT METHODS IN THE BID PROCESS TO IMPROVE THE HIT RATE USING THE EXAMPLE OF A PLANT ENGINEERING AND CONSTRUCTION COMPANY**

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### **Abstract**

Application of project management methods has increased dramatically in recent decade. In the sector of international plant engineering and construction, project management focuses on the contract execution. But the main process which initiates the contract award is the competitive bidding process, so the objective of each company is to reduce up-front cost and to increase number of successful bids. The success of bidding can be measured by the hit rate as key performance indicator.

An initial literature review evaluated the current state of knowledge relating to the connection between project management and bid management. The result gives rise to the assumption that the application of project management -methods would also be worthwhile in the phase of competitive bidding. Subsequently 26 bids, prepared by a company in the plant engineering and construction industry, were processed and evaluated with respect to qualify the bidding process and its project management methods.

This research concludes that application of project management methods in the bidding process is a reasonable and sustainable measure for improving project and business success.

### **Keywords**

Competitive bidding, project management, bid management, hit rate, project success.

**JEL Classification: M1, O22, O12**

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### **Introduction**

At the core of any company strategy is the proposal of an attractive offer to the client, which, after being awarded, results in revenues for the offering company. Within the plant engineering and construction sector, the preparation of bids is associated with considerable levels of required resources and thus costs, dependent on the complexity of the project. These costs must be borne by the bidding company and constitute a significant proportion of general company overheads (Girmscheid, 2010, p. 25). One of the measures that support company success is modern project management, as developed, described and also certified

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by several international associations (e.g. PMI, IPMA). The application of project management methods (PM-methods) in business life has increased dramatically in recent decades. Complex social, economic and commercial challenges associated with large investment projects have promoted project management as an important strategic tool, which helps to master these increasing challenges (Fauser, et al., 2015, p. 66), (Patzak & Rattay, 2009, p. 575f).

Girmscheidt (2010, p. 9) refers to analysis conducted by ETH Zürich, whereby around 60% of projects with negative project returns (=losses) originate in the bid phase and identifies reasons, including *'[...] insufficient understanding of tender documents, incorrect estimates of resources required, unrecognised technical and contractual risks or the selection of unreliable subcontractors'*. Another 10% of the negative project returns can be traced back to factors that cannot or can barely be influenced and 30% of problems originate in deficient executive management.

Optimising business processes to improve quality and transparency, as well as to comply with the market needs is necessity for sustainable business (Just, et al., 2016, p. 23), (Bejinariu, et al., 2016, p. 30). For the company in plant engineering and construction, the process of bidding (the phase preceding the contract award) is the main decisive, strategic process, because only the contractually valid implementation enables income generation and a commercial livelihood (Geiger & Krüger, 2013, p. 60). Therefore, in order to increase project returns, the bid phase is an important object of consideration for any optimisation efforts, and every company must constantly strive to increase the ratio of the number of contracts awarded to the number of bids (Girmscheid, 2010, p. 25). As such, the present study determined in detail whether the application of PM-methods in the bid phase leads to better economic efficiency in the bid process, in the sense of a higher hit rate. An initial literature review evaluated the current state of knowledge relating to the connection between the application of PM-methods, competitive bidding and bid management. Subsequently, 26 bids prepared by a company in the plant engineering and construction industry between 2002 and 2015 were processed and evaluated with respect to the research question.

### **1. The bid process in international plant engineering and construction**

In general, 'plant engineering and construction' refers to the planning and construction of technical plants, characterised by long-term individual assembly projects in frequently changing locations with a high amount of pre-financing, high contract value, high (and increasing) service share and discontinuity of incoming orders (Theuermann, et al., 2015, p. 1f). In view of the fact that each bid preparation in plant engineering and construction is 'unique' each time, and therefore causes significant expenses, the optimisation of the bid phase is one of the most important requirements in plant engineering and construction (Geiger & Krüger, 2013, p. 83). The bidding company firstly has to reach a decision on which bids to actually prepare, selected from a range of possible project ideas arising from active development of project opportunities or pre-selection of identified project opportunities (Girmscheid, 2010, p. 25f). The suggested approach for prioritising projects according to specific qualitative and quantitative 'key performance indicators' (KPI) by Scheiblich et. al. (2016, p. 104ff) can also be applied to bid projects. The approach first considers a rough pre-selection, then the evaluation of relevant quantitative key data and subsequently the evaluation of a qualitative assessment using a 'scoring method'. This process as part of business development already has an influence on hit rate and on

subsequent contract execution (Kock, et al., 2016, p. 116). In actual business life, often only one of ten submitted bids will actually lead to a contract being awarded (Jakoby, 2012, p. 48), (Lutz, 2006, p. 21). Expertise on how to efficiently prepare bids and ensure they lead to a successful contract is a key competence in plant engineering and construction and is decisive for the economic viability and growth of a company. The following schematic illustration (Figure no. 1) shows the step-by-step selection from a range of project ideas:

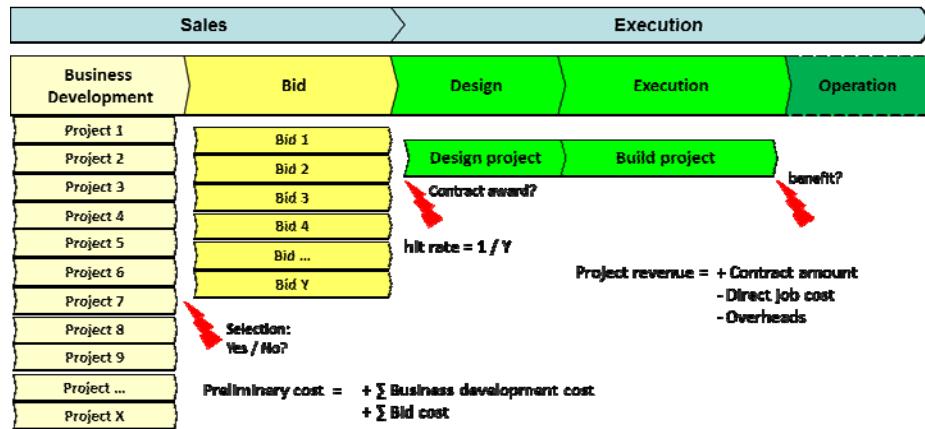


Figure no. 1: From a range of project ideas through to the actual contract processing

Source: authors

Successful bids need to be correct and complete and correspond to the desires and expectations of the client. A bid must demonstrate clearly to the client that the people who prepared it have worked hard and conscientiously, that the available tender documents have been analysed precisely and that the bid documents have been exactly tailored to this specific request, rather than cobbled together by copying and pasting from other documents (Lewis, 2015, p. 4). As such, expertise and experience in project management is needed.

## 2. Performance indices of the bid process

The success of the bid process is substantially characterised by the number of bids and the resulting contracts awarded (Preisinger, 2015, p. 226ff). The hit rate (Lewis, 2015, p. 58) or 'win rate' (Jaques, 2013, p. 160f) as related to the number of bids is the quotient of 'successful bids' divided by the 'total number of submitted bids' and is represented as a percentage (Kühnapfel, 2014, p. 10), (Meyer, 2011, p. 110):

$$\text{hit rate 1} = \frac{\text{successful bids (contract awarded)}}{\text{total number of submitted bids}} \times 100 \quad (1)$$

If the tender procedure is cancelled by the investor, the hit rate can be adjusted as the total number of submitted bids is reduced by the number of cancelled procedures (Jaques, 2013, p. 161). This is determined as 'hit rate 2' in further text.

There is no universally valid determination of how the hit rate should be calculated, and therefore it is difficult to compare the available information from different companies or

their staff responsible for bids. In practice, it is certainly important that the agreed calculation method is used consistently within a company, in order to be able to determine a negative or positive trend (Jaques, 2013, pp. 147, 162).

### 3. Project management in the bid phase

First of all, it must be judged whether an idea for a bid preparation is project worthy. This will be done according to each company structure e.g. by sales management, responsible key account managers or company executives (Patzak & Rattay, 2009, p. 86).

In addition to considerations of quality, costs and time, the different PM standards have described a number of 'objects of consideration of project management' or 'project dimensions of project management', which are planned and managed by PM-methods. According to IPMA, from the totality of PM-methods the following PM-methods are identified as 'central PM-methods' (PMA, 2008, p. 56): Project assignment (1), Project objectives (2), Objects of consideration plan – OCP (3), Project environment analysis – PEA (4), Work breakdown structure – WBS (5), Milestone plan (6), Organisation chart (7), Project responsibility matrix (8), Work package specification (9), Bar chart (10), Resource plan (11), Cost plan (12). In the project handbook (PHB), the results of specific applied methods are gathered and constantly updated. As an aggregate document of all project plans for the applied PM-methods, the PHB is also seen as a PM-method (no. 13) in the present study.

Because the bid phases in the area of international plant engineering and construction are generally not routine tasks, but are very comprehensive and time and resource intensive, it is recommended in project management literature to treat these processes as bid projects, and to design them with the corresponding levels of professionalism and efficiency (Jakob, 2013, p. 45), (Burghardt, 2012, p. 57f).

### 4. Project management success vs. business success: 'the operation was successful, but the patient died'

Many bidders see this submission of the bid to the client as the end of the bid phase, because the intensive and often stressful preparation of the required documents is finished, and the next steps will be specified by the client. The client will check and evaluate all submitted bids. Adaptions our amendments by the bidder are no more possible and in public procurement strictly prohibited, but the bidder has to be at clients disposal for further clarification (Girmscheid, 2010, p. 101ff).

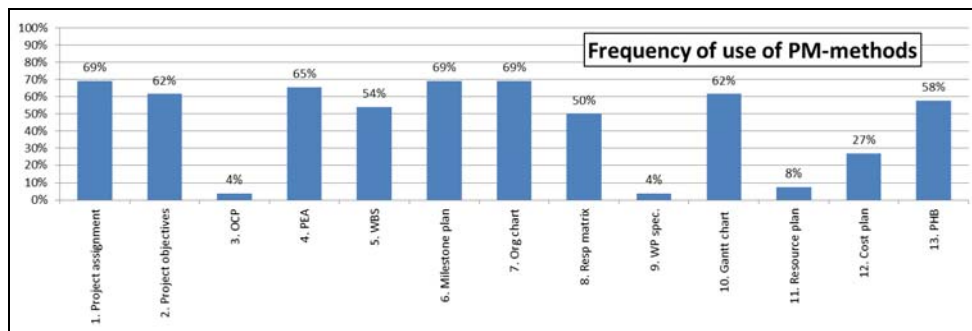
If the contract is actually awarded after all bids have been assessed, then the bid manager and his team will conclude their tasks and transfer all relevant documents and information to the project organisers for the subsequent project (Tweedley, 1995, pp. 30, 133), (Girmscheid, 2010, p. 340). If another bidder or no bidder was awarded the contract, then the overall commercial aim of the bid (the contract award) was not reached. A project close-down phase must nonetheless be initiated. Even if the bid did not result in a contract being awarded, the fulfilment of the project objectives will depend on whether the reasons for failing to win the contract were in the company's sphere of influence (late submission, deficiencies, gaps, misunderstandings etc.) or if they were unforeseeable (Williams, 2016, p. 109), (Heinrich, 2015, p. 70f), (Burghardt, 2012, p. 43f). Increasing quality in project management processes improves success (Just, et al., 2017), but the completion of a bid project must be distinguished in the 'project management success' and the 'business success':

- **‘Project management success’** = project objectives achieved (IPMA, 2006, pp. 16, 40), (PMI , 2013, pp. 21, 35): Was the (bid) project management process concluded successfully? Was the bid process executed efficiently, did it meet the predicted bid costs (= project budget) and stick to the time plan, and was the quality acceptable (free of mistakes, free of unrecoverable errors)?
- **‘Business success’** = contract awarded = ‘hit rate’ = business objective achieved: was the ‘correct’ bid project executed? Was the company aim reached? Or did the client have to end the tender process without an award or cancel the tender process because it emerged that a realisation would be impossible?

**5. Evaluation of case studies**

The company examined in this study is active in international plant engineering and construction. As a full-service provider it offers the design, construction and operation of engineering plants for water supply, wastewater disposal, as well as heat and energy generation.

The examined bids originated in the years between 2002 and 2015 and relate to drinking water treatment plants and wastewater treatment plants. For each bid, it was determined which of the 13 significant PM-methods were applied. In addition, it was noted whether the bid objective was met, namely with respect to **project management success** (the bid was delivered on time, is complete and meets the requirements of the tender) and **business success** (the contract was awarded to the bidder). The following graphic (Figure no. 2) depicts how frequently the individual PM-methods were applied in the 26 case studies.



**Figure no. 2: Frequency of application of individual PM-methods in percent of numbers of case studies**

*Source: according to the study conducted by the authors*

The PM-methods (3) OCP and (9) work package specification were each only used once among the 26 case studies. The PM-method (11) resource plan was applied in only two of the 26 case studies (8%) according to the methodology laid down by the PMA (PMA, 2008, p. 34). The cost plan (12) was also only used in 7 of 26 cases. The expected staff costs were roughly estimated for all bids, but a cost plan and cost controlling in the sense of the PM-method only occurred in the named seven cases.

The following groups were formed to simplify further analysis:

Group nPM: Bids with fewer than five PM-methods applied (10 of 26).  
 Bids within this group were done with no or less expertise in project management.

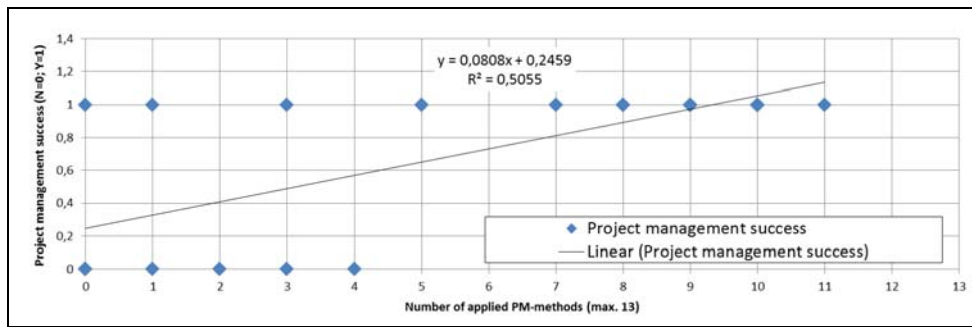
Group yPM: Bids with five or more PM-methods applied (16 of 26).  
 Bids within this group are considered to be managed by project management.

The following graphic (Figure no. 3) shows that in the group yPM (five or more PM-methods), all bids met their project management objective. As such, the project management success in this group is unsurprisingly 100% calculated based on formula (1):

$$\text{Project management success}_{(yPM)} = 16 / (26 - 10) \times 100 = 100\%$$

Among the bids in group nPM (fewer than five PM-methods), only three met the bid objective (30%) and three received the contract award (30%), calculated based on formula (1):

$$\text{Bid management success}_{(nPM)} = 3 / (26 - 16) \times 100 = 30\%$$

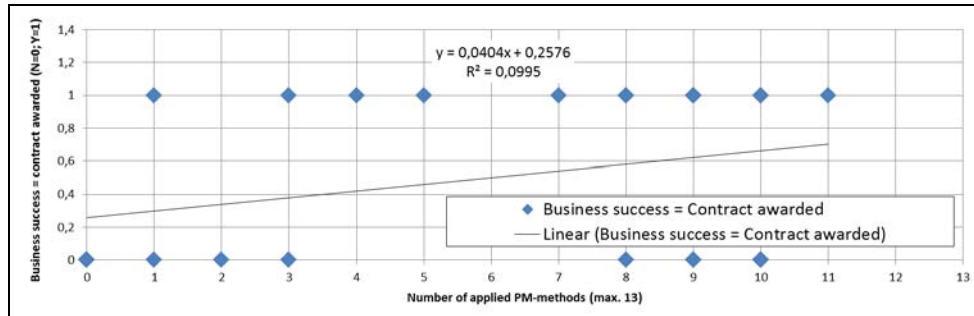


**Figure no. 3: Project management success in relation to the number of applied PM-methods**

*Source: according to the study conducted by the authors*

However, it is notable that in group nPM two bids won the contract even though they had not fully met the bid objectives, which gives rise to the assumption that the competitors were simply even worse or there was luck involved. Conversely, two bids met their bid objectives, but still did not win the contract, which was because the bid price was too high, or rather, one can interpret that the competition was simply better.

The next graphic shows the correlation between the number of applied PM-methods and the contracts awarded (the 'business success'):



**Figure no. 4: Business target 'contract awarded' achieved in correlation with the number of applied PM-methods**

*Source: according to the study conducted by the authors*

The data series initially do not show a clear connection, but the detailed evaluation nonetheless enables an interesting interpretation: in the group yPM (16 bids), the contract was actually awarded in ten cases. Two procedures were cancelled and of the remaining four, three bids were too expensive. The remaining bid was awarded to a competitor, despite a lower price. A related appeal failed due to formal obstacles. The hit rate is therefore as follows:

$$\begin{aligned} \text{hit rate 1}_{(yPM)} &= 10 / 16 \times 100 = 63\% \\ \text{hit rate 2}_{(yPM)} &= 10 / 14 \times 100 = 71\% \end{aligned}$$

In the groups nPM (10 bids), the contract was awarded in three cases, one tender process was cancelled and the remaining six bids were too expensive. The hit rate is therefore as follows:

$$\begin{aligned} \text{hit rate 1}_{(nPM)} &= 3 / 10 \times 100 = 30\% \\ \text{hit rate 2}_{(nPM)} &= 3 / 9 \times 100 = 33\% \end{aligned}$$

Interpretation of the authors: although the actual rate of contract awards is dependent on many external influences, in group yPM an increased hit rate from 33% to 71% could be determined, outlining that the application of PM-methods can reduce or even eliminated internal company weaknesses.

### Conclusion

From a quantitative perspective, for comparable companies in plant engineering and construction nearly a doubling of the hit rate (from 33% to 71%) can be assumed, whereby no universally valid prediction can be derived, because the companies are too diverse.

The differentiation between business success and project management success in the present study is based on the fact that in reality, the actual awarding of contracts is heavily dependent on competitors and clients. Even if the bid team submits a technically, commercially and legally flawless bid and perfectly meets its project objectives, a competitor's bid could be less expensive and be qualitatively sufficient for the client.

The results of this study can also be interpreted as follows in the sense of the motivation of the bid team: by applying PM-methods in the bid phase, the bid team can triple the project

management success (from 30% to 100%) and at the same time double the hit rate (from 33% to 71%).

In general, the present study has difficulty in transferring the conclusions to other companies, because the quality of the considered processes is heavily influenced by the persons involved and their interpersonal skills. The possible effects of the PM-methods are hard to compare, since the repeatability of a measure is not possible in practice. The alternative to one method can never be executed in the exact same conditions. The application of a method changes the 'system' and it is not possible to 'reset' to the initial situation, since experiences with the previous attempt cannot be 'erased'.

However, the positive indications are so clear that the application of PM-methods in the bid process must be recommended from a qualitative perspective.

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