Tendering for engineering contracts

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ABSTRACT

This paper describes a generalised model that embodies the criteria assessed during the tendering process, where if all the pertinent criteria are met, then the risk when submitting the tender is minimised. This provides a framework for isolating the important tender criteria and relating this to the control of activities in the tendering process. A process model is presented that describes the tendering process at a sufficiently high level that is independent of corporate rationale. A number of subprocess models are included to show how the high level model can be adapted in order to introduce a dynamic element into the tendering process. The results of an initial case study are presented. The subject of the case study is a major engineering systems supplier and it is shown how their tendering process for design and build contracts sits within the tender classification and process models.

1 INTRODUCTION

Tendering is one of the key avenues for procuring work in the engineering sector. Any tender prepared by a business organisation to supply goods and services may become a firm commercial commitment and therefore must be seen as an indicator of the organisation's competence and capability. Some studies have been carried out that indicate the information required in order to produce a tender (1,2) and there are numerous studies related to the bid and mark-up decisions for both general and specific applications (3,4). Some papers have indicated a process model (5) and others have attempted to link such models with information requirements (6). Much of this work is limited, however, by either being too general to be usefully applicable by industry or too specific to be applied in more than one domain.

This paper attempts to lay the foundations for a data driven approach to tendering, where certain criteria that should be addressed are highlighted and an understanding of the tendering rationale is used to isolate which of these factors are most applicable in a given situation.

Finally, by developing a task based generic process model that is configurable to include new tasks then it will be possible to provide process guidance that assists tendering managers to best utilise their resources to explore the information requirements for a specific tender. The ultimate aim of this approach is to provide a methodology that facilitates the reduction of risk in tendering which can therefore be used to improve the competitiveness of organisations. This paper details the current state of the work with a description of the tendering information requirements and a generic tender process model. A case study is used to show the relevance of the risk information view of tendering and how the generic process model can be customised to a specific process.

2 SOURCES OF TENDER INFORMATION

For a successful tender to be submitted, it is preferable, if not imperative, for the bidder to possess all current information available to them with regard to the project. In addition, the decision to bid, and any subsequent financial decisions, also must take into account the numerous business considerations experienced by the organisation.

The typical format of tendering information available will vary depending upon the organisation or project in question. Information on the technical issues of the project will generally be documented better than information regarding issues such as the company's relationship with the client or problems with the project location. Any documentation on "soft" management issues of this nature will be contained within informal memorandums, emails or letters. The quality of this information will be generally be incomplete, inconsistent and extremely difficult to re-trace after the tender submission has taken place. Technical issues will tend to be of higher quality due to the presence of product specification documents, minutes of conceptual design meetings and preliminary technical drawings allied to normal correspondence as stated for "soft management" issues.

Lack of documented information means that currently proposal managers rely heavily on personal memory, built up during the course of the bid, to assess the relevant information. They will however still analyse the soft management information but obviously only the information which they have the ability to recall. Situations of this nature mean that it can be very difficult for colleagues and even superiors of the proposal manager to understand the decisions the proposal manager has taken. In the worst case, the replacement of a proposal manager mid-tender can have dire consequences for the potential tender and subsequent tender success.

3 CATEGORISATION OF TENDER INFORMATION

To assess the information used during the tendering phase of any engineering project it is important to categorise the tendering information (2) in order to demonstrate which information segments are most significant to the decision process. The information has been divided into twelve distinct categories. Each distinct category can be described as a tender "risk area" and contains within it information which it is essential for the tendering organisation to consider when evaluating the merits of a proposal. The degree to which each risk is explored, considered and evaluated depends upon the individual character of project. However, regardless of the project, each risk area must be considered to some extent. It

should be noted that although the information has been categorised to easily distinguish areas of tendering significance, it is highly probable that the information assessed within one particular "risk area" will influence the assessment of information in other "risk areas". The complexity of the tendering process is such that it is feasible thus for the information contained within a "risk area" to possess inter-dependency links with information in other "risk areas". A breakdown of the identified generic tender "risk areas" and their classification is detailed in Figure 1.

Each "risk area" has several contributing risks that must be considered in order to fully establish the potential problems and opportunities inherent within each tendering opportunity. All the tender "risk areas" have been broken down into a series of contributing tender risks. An example of a typical "risk area" breakdown is shown in Figure 2.

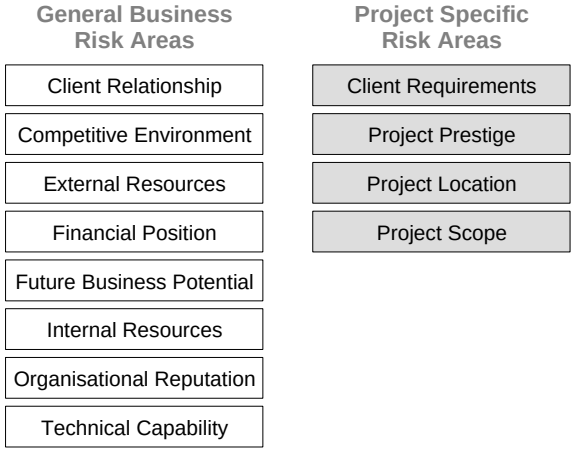

Fig. 1 Risk area categorisation

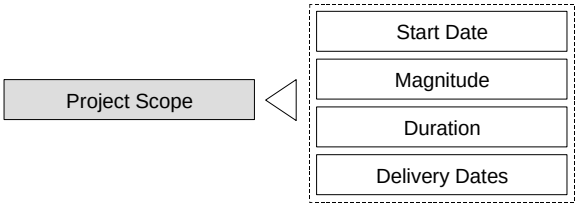

Fig. 2 Example tender risk breakdown

As identified in Figure 1, the contributing data contained within each "risk area" is classified as either project specific in nature or of general business concern. It has been observed that the fundamental distinction between project specific and general business risks is in their capacity to be affected by the tender process. Both sets of risks have the ability to affect or drive the decisions which must be taken during the tender process but only general business risks can be affected during the course of a tender. Of critical importance is the assertion that this information flow implies it is important to first assess the project specific risk areas when assessing the overall merit of a proposal.

There is one unique mechanism whereby project specific risks can be affected during the tender process. Upon qualifying the extent of the tender risks, the tendering organisation must make the decision as to whether the information collated suggests that the potential risks to the project success are acceptable. If the project circumstances are deemed to be acceptable, the bid should be made. If the tender risks are not acceptable, the tendering organisation should not bid for the project in its current format. The project specific risk areas of "client requirements" and "project scope" can be affected if the tendering organisation attempt to re-negotiate the projects original parameters with the client in an effort to transfer the previously unacceptable project risks. However, the information identified at the tender stage should not be considered in isolation. Instead, the information should be utilised as the basis for the subsequent detailed planning of the project.

4 GENERIC TENDER PROCESS MODEL

One of the key aims in current work has been the development of a generic model of the tendering activities. This model has been constrained to be a model of the activities that make up the process in order to facilitate the future development of an activity based guidance tool. In the work to date, a range of companies operating within various sectors of the engineering industry have been examined. The tendering activities have been simplified into a set of high level tasks that are common across all the companies considered. By allowing sub-models to be developed that are unique to a particular company, then the proposed model can be seen to be not only generic at the highest level but also configurable to meet any requirements.

The hierarchical nature of the model lends itself to modelling methodologies such as IDEF0. However, these modelling methodologies are inherently too complex too allow simple visualisation and in this paper the model is presented as a set of nested flowcharts. The top level (generic) model is shown in Figure 3.

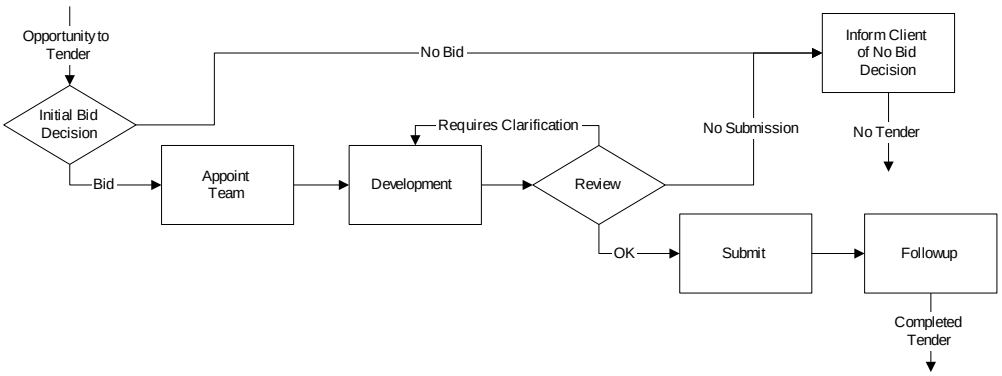

Fig. 3 Generic process model

At this level, the tender process is essentially sequential, with iteration only occurring around the development, review and implicit assessment of the tender content. In many domains, such as the construction industry, where companies have relatively stable cost models then even this simple iteration may not occur. This model shows that there are essentially three possible outcomes for a given tendering opportunity. The first is to decline the tender invitation after an initial inspection. The second is to carry out some degree of work before deciding the decline the invitation. The final outcome is a tender submission. Each of the key stages of the process can now be considered.

4.1 Initial bid decision

The high level model includes an assumption that the opportunity to tender input to actually includes a common sense filter so that only appropriate tenders reach the initial bid decision stage. The initial bid decision in the high level model actually represents a process that culminates in one or more decisions, thus enabling the merit of an individual tender to be assessed.

4.2 Appoint team

The stage of the tender that deals with the appointment of the tendering team is a key stage of the tender process. It involves analysing the tendering opportunity to gauge the skills and

experiences required to complete the tender as well as the risks to the company and the corresponding level of authority required to approve the submission of the tender. Given that the aim of this work is to incorporate risk management into the process, this stage should also consider the availability of key staff for the tender period rather than just identifying staff with the required experience.

4.3 Development

In general, the development of the tender involves the investigation of key areas that correspond to the tendering opportunity. By generating information, such as estimated cost, it is possible to provide the client with a statement of intent. In addition to this, the information generated can be used to analyse the probability of failure. This can subsequently be compared to the perceived project risks in order to facilitate the development of a risk management strategy for use during the project life cycle.

4.4 Review

The tender review is used to determine whether sufficient information has been generated such that an informed decision can be made to submit the tender. At this stage of the process the decision generally has three outcomes. The first of these is to approve and hence submit the tender. The second is to not approve the tender and carry out further development work. The final decision is to opt to cease work on the tender and decline the opportunity to submit. The decision to decline an opportunity to tender can also be made at any time through out the process if there is sufficient justification.

4.5 Submission

The tender submission phase essentially involves the presentation of the project information and plan of work to the client, subject to the clients preferences and the tendering companies own submission guidelines. It should also include an investigation of the possible legal issues surrounding the tender and the ensuing contract should the tender be accepted.

4.6 Follow-up

No tender process can be viewed to be complete until a follow-up is carried out. Even successful tenders should be followed up in order to determine what the client viewed the strengths of the tender to be. For failed tenders, this phase should be used to find out the reasons that the tender was rejected. In both cases, this information should be used in order to improve the quality of future tenders and cultivate a relationship with the client that may lead to future work.

5 CASE STUDY

The manner in which companies respond to the risks involved in the tender process has been observed in a case study with a major engineering systems supplier. The marketplace is within which the company operates is highly stable with, at present, only three significant participants. The high technology end of the market is the area where the collaborating company has a reasonable market share and competes regularly against one of the other companies for the same contracts. The third company tends to produce lower specification systems and direct competition is infrequent. With such a small number of competitors, the collaborating company has a very good understanding of the capabilities and present status of their competitors. They are therefore aware of the value, as opposed to cost, of the products.

Given the nature of the market, the company has an attitude that all tender invitations received will be responded to. They have developed a simple range of computer based tools that facilitate the tender process. These include a cost database for system components and a set of tender document templates. This allows a response to simple invitation to tenders to be made within a period of hours rather than days. However, by carrying out interviews at the collaborating company it was found that the organisational structure did not allow for the best use of these tools. The company utilises separate sales and project teams with project control passing from the former to the latter once a tender contract has been agreed. A lack of communication between the teams can potentially lead to inaccuracies in the cost database and therefore an implicit commercial risk. For non-standard systems, this communication barrier can also lead to the sales teams agreeing a product specification that has an inherently high factor of technical risk.

It is possible to highlight which risk areas the company currently assesses extensively as well as in which risk areas they demonstrate only superficial consideration. Their main strengths are in understanding the competitive environment in which they operate and their own financial position. They are reasonably strong in understanding their own technical ability and the requirements of their clients, although this is occasional hampered by the said lack of communication between the sales team and the project engineers. The company is particularly weak in determining their internal and external resource capabilities which can lead to problems if too many tenders are won in a particular period of time.

The tendering process of the company fits within the generic model described in section 4. The top level model can be expanded out into sub-models. The models are all fairly simple, for example the initial bid decision sub-model, shown in Figure 4, is simple due to the company attitude that all tenders will be cost estimated, if not bid for, and the only activity that really occurs is the clarification of the authorisation level required. This action may lead to a senior sales manager informing the contact sales engineer not to bid.

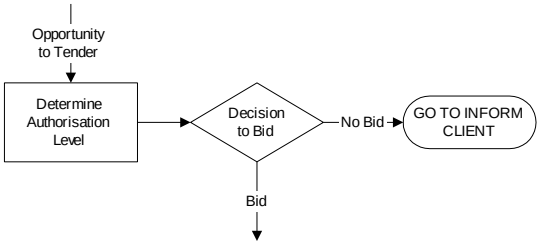

Fig. 4 Initial bid decision sub-model

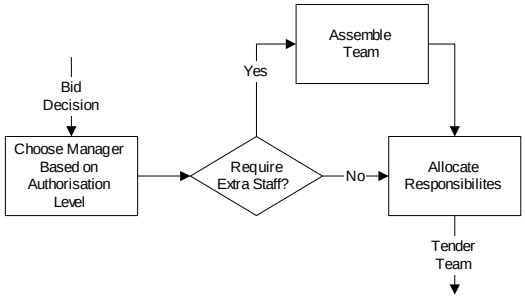

Fig. 5 Appoint team sub-model

Given that the company has tools in place to facilitate the development of cost information, the appoint team sub-model as shown in Figure 5 is also very simple. Only for large tenders will a tender manager be appointed who is not the contact sales engineer. Additionally, it is only these tenders for which a tendering team is formed. For the vast majority of tenders the contact sales engineer will carry out all of the tendering activity with occasional support from a senior sales manager.

The company has in place a procedure in place for determining the cost of a project. This

includes the request for tenders from sub-contractors and the use of the internal cost database. There is no technical design work carried out at this stage due to the modular nature of the systems being built. The tender development sub-model is shown in Figure 6.

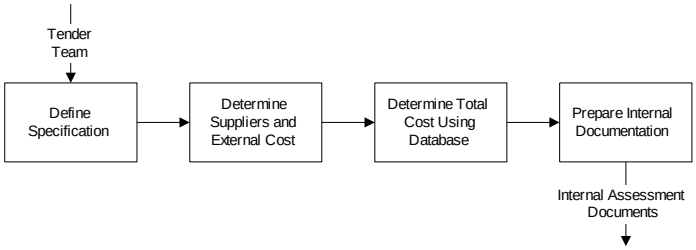

Fig. 6 Company "development" sub-model

Once the cost information has been generated and internal documentation produced, the company will carry out a review. In the simplest cases this will consist of a meeting of the contact sales engineer and a senior sales manager. In larger tenders the entire tender team is expected to attend. The process followed is shown in Figure 7.

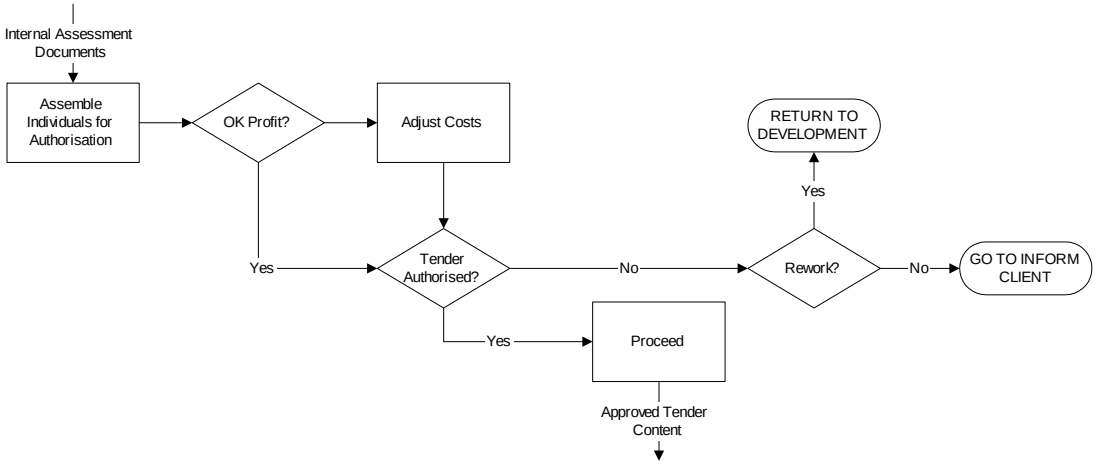

Fig. 7 Company "review" sub-model

The company has a stated profit margin which must be obtained in all contracts. Owing to the company culture there is a tendency for staff to regularly work beyond their scheduled working hours. The company will often indirectly use this understanding of their staff's tendencies to submit a bid that contains a lower resource requirement than is knowingly required to complete the project. This obviously reduces project costs and therefore increases the profit margin due to the bid price remaining static. If it is felt the company's resources are at present stretched then the costs are recalculated, though this is a rare occurrence. If the tender is authorised then the contact sales engineer will proceed with the submission of the tender, the process for which is shown in Figure 8.

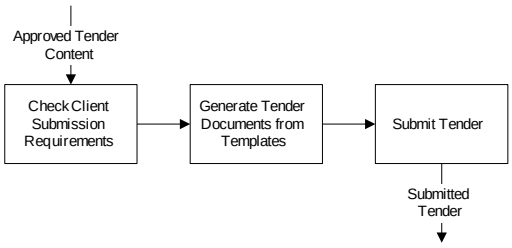

Fig. 8 Company "submit tender" sub-model

The tender submission is very simple, where tender documents are generated from the internal templates subject to whatever constraints are specified by the client. The internal documents are designed such that they include many company standard statements and legal clauses that are intended to reduce the commercial risk posed by non-compliance. The company does not assess their ability to comply with, for example, technical requirements and as such these are a standard risk prevention technique rather than a pro-active risk management methodology.

6 CONCLUSIONS

This paper has presented an insight into the information requirements for tendering activity in an engineering organisation. Further cases studies are required to prove the generic nature of these requirements, but it is believed that by understanding the corporate strategy of a given organisation it is possible to determine the specific required emphasis.

Similarly, a model of the tendering process has been proposed that has a generic nature but can be configured to incorporate company specific interpretations of the different stages of the tender. Again, further case studies are necessary to validate this model and these will be used to introduce the concept of a "best practice" process.

Future work will begin to integrate these two areas in order to produce a tender process guidance tool. By understanding the relationship between the information requirements and the activities in the tendering process, it will be possible to provide a decision support system. This system could suggest the activities that will yield the most efficient use of resource to minimise the risk in the tender given the current extent of information that is still uncertain.

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