Bachelor thesis

Improving results in tender procedures at EGW d.o.o.

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Management summary

Management at EGW aims to improve the chances of success in tender procedures for installation projects. Therefore a student Industrial Engineering and Management from Twente University was given the task to examine past results and procedures to find suggestions for improvement.

The following recommendations are made based on the research:

- Outcomes of tender procedures should be recorded systematically and analyzed for problems or market trends.
- A database for standard costs should be set up. These costs should be used when preparing proposals and after a project a calculation should be made to compare the actual costs to the standard.
- Costs for engineering, supervising and transportation should be allocated to the projects to which they are related and not to a general overhead factor.

The aim of the research was to give recommendations to improve the success scores in tender procedures for EGW. To start past results were studied. This revealed that the success scores for different types of projects in the past showed few significant differences. Only projects including mechanical installations had a higher success score as well as projects not including gas and water installations. These differences were most likely due to the former shareholder of the company and market conditions. Therefore the research would include all types of projects.

Procedures are very important for the acquisition of orders in this industry. Public and private customers follow tender procedures that are quite similar, most commonly an open tender procedure. However public customers have to adhere to the rules on tenders set in the Public Procurement Law. From the most frequently used procedures follows that in theory a tender procedure could be lost in three ways. The proposal can be not compliant, the proposal may be rejected because the company or proposal does not meet prequalification criteria or the proposal is not chosen on the selection criteria.
With this division in mind proposals that had been sent in to customers were studied. In all cases a tender procedure is lost because the proposal is not chosen on basis of the selection criteria, not because of non compliant proposals or rejections on prequalification criteria. Therefore there is no need to revise procedures for preparing for tenders to improve compliance or score on qualification criteria.

Attention should be paid to the selection criteria. The study showed that price is the most important selection criterion used by customers and it causes most lost tender procedures for EGW.
Prices in construction industry are set based on costs, the quoted price is however adjusted for market conditions. EGW uses a similar method.
Information and cost advantages are important for success in tender procedures. In order to be able to set prices lower, without increasing financial risk, cost data should be accurate. This includes the costs for labor, materials, transportation and supervision. Therefore a database for standard costs should be created and costs should be accurately allocated.
Also market conditions should be monitored. These include keeping track of trends in the number of projects and the success score for different kinds of projects.

The recommendations should result in more accurate estimates of costs and allocation of overhead costs. Therefore performance can be measured better thereby revealing activities that need improvements. It could also have a positive effect on motivation of employees. Improvements in performance results in lowering of costs. Price of proposals could be set lower because of lower costs and more accurate estimates thereby improving the success score in tender procedures.

Preface

This report is the conclusion to my bachelor degree in Industrial Engineering and Management at the Twente University. I had the unique opportunity to conduct my research in a foreign company. I spent three interesting months in Sarajevo in Bosnia and Herzegovina. I would like to thank the following people who helped me make this opportunity a reality for me.

First of all the company EGW d.o.o., in particularly Mr. Tanović and Mr. Aganović for taking their time to explain me so much about the company, tenders and construction industry in Bosnia and Herzegovina. Also my thanks go to my colleagues who made my stay at the company a pleasant time.

I would also like to thank Mr. Kroon, my examiner from Twente University. Although far away he helped me with my research in his own positive way.

The people from AIESEC also deserve my thanks. They made my bachelor thesis into a whole new international learning experience and as well as I had a good time with them. Last but not least I would like to thank my family for the support they provided me during these three months.

Sarajevo, July 2007

Pieter Heeres

Chapter 1: Research plan

This chapter will describe how this research project was set up. It will give the objective, problem definition and research questions. The choices for the questions are explained as well as the way information was gathered to answer them.

The main product of EGW is the designing and construction of installation for gas, water, electrics, sewage or HVAC. In the construction industry it is common that customers organize tender procedures to select a supplier. In such a procedure suppliers compete to win a tender and be awarded the contract. Acquisition of large installation projects by EGW is always done by tender procedures. A more detailed description can be found in the next chapters.
It is important to win tender procedures and that is why the management of EGW wants advice on how to improve the chances of winning in tender procedures.

Objective

- Advice the management of EGW on how to improve the chances of winning in a tender procedure for installation projects.

Problem definition

In order to reach this objective the following problem definition must be answered.

- How can EGW improve its chance of winning a tender procedure?

Research questions

To obtain an answer for the problem definition the following research questions must be answered.

- What types of projects have a significantly different tender success score?
- What kind of tender procedures do customers use in selecting a supplier?
- How does the tender procedure affect tender success score in theory?
- How does the tender procedure affect tender success score in practice?
- How are tender proposals priced by EGW and the industry in general?
- What improvements can be made to improve the tender success score for EGW?

Operational definitions

To avoid any ambiguity operational definitions are given for the most important concepts of the research.

- Tender success score: the fraction of tender procedures won out of the total number of proposals send in.
- Tender procedure: the process organized by the customer by which the customer aims to select a supplier.
- Winning a tender procedure: when proposal of the supplier is chosen by the customer and a formal contract is signed.

Research design

The overall of the research can be divided into three phases. In the first phase the current situation is examined in more detail by looking for differences in success scores for different projects. This will determine on which type of projects the research will focus.
In the second phase tender procedures are examined. These procedures determine the choice of a supplier company and are therefore important to study. Procedures are studied on how they are organized and how they affect tender success both in theory and in the current situation.
The third phase pays attention to the reasons for not winning tender procedures found in the previous phase. These are examined more closely and improvements will be proposed.

Because of this approach the research will be incremental. Subsequent phases depend on the outcome of the previous. This is also the logic behind the research questions which were formed as the research progressed.

It is to be noted that this research only deals with tender procedures for installation jobs because other products are usually not sold in tender procedures. Also the choice for which project to send in a proposal is left out of this research. It is to be expected that on average the same kind of projects is chosen, because the decision makers have a lot of experience in the industry.
Now per research question the purpose and strategy to gather information needed to answer them is given.

1

- What types of projects have a significantly different tender success score?

This question aims to map out the current situation. It will focus on proposals that have been sent in to customers to determine if the chance of a successful tender depends on certain characteristics of the project. The effects of public or private customer will be studied as well as the type of project and the size of it. By answering this question a decision can be made to focus the research on certain types of projects.
This question will be answered by studying all tender proposals submitted in 2006 and 2007 up to April. Records are kept for each proposal submitted so these can be used as a source for data. Because the outcome of tender procedures is not recorded systematically, interviews will be held with the executive director.
To answer this question the gathered data will need to be analyzed. Statistical analysis will be made using the computer program SPSS. To determine significance a 10% unreliability threshold is used.
This part of the research can be classified as quantitative, monitoring and ex post facto. Although the interviews are a form of data collection known as communication study. The purpose is descriptive. (Cooper & Schindler, 2006)

2

- What kind of tender procedures do customers use in selecting a supplier?

Because the customer has a great influence on tender procedures it is important to study it. This question aims to identify how customers decide what supplier to hire. The most obvious way to get the data needed for this question would be to contact customers. This is however practically impossible since I do not speak Bosnian.
Therefore information will be gathered by studying the tender documents and tender evaluations prepared by the suppliers. Also the Bosnian Public Procurement Law will be studied, because a part of the customers has to adhere to the rules it sets on procedures.

- How does the tender procedure affect tender success score in theory?

The purpose of this question is to find factors that affect tender success in procedures and thereby to provide a framework for the research. These factors first need to be identified before they can be studied and subsequent improvements suggested.
Besides studying tender documentation, information will be found on the internet. Because I have no access to online databases with scientific articles this will only include what is available public on the internet. Therefore this information will have a less scientific approach but a more practical one to tender success.
This will give me information about how the customers make their choices and allows for a closer look at why tenders are won or not.
The approach to these two research questions can be described as a descriptive study, using monitoring to collect data. There is no influence on the variables so it is an ex post facto design. (Cooper & Schindler, 2006)

- How does the tender procedure affect tender success score in practice?

The purpose of this question is to asses what problems in the current situation are holding back greater success in tender procedures. The analysis will be made using the factors found in the previous research question.
Data will be gathered by studying a number of proposals send in by EGW. These proposals will be analyzed for problems that caused failure in the tender process. To get a better insight interviews with the executive director will be held.
To answer this question both monitoring and communication studies are employed. Again there is no influence on the variables so it is an ex post facto design. It is causal because it aims to find why tenders are not won. (Cooper & Schindler, 2006)

3

The previous phase found that price is used as an important selection criterion and was the main cause for not winning tenders for EGW. Therefore pricing will be studied in more detail.

- How are tender proposals priced by EGW and the industry in general?

This research question sets out to study how proposals are priced by EGW. Literature on price setting will be studied and an interview held to find out how prices are set.
The approach to this research question can be described as a descriptive study, using monitoring to collect data. There is no influence on the variables so it is an ex post facto design. (Cooper & Schindler, 2006)

- What improvements can be made to improve the tender success score for EGW?

Based on the results found by previous research questions this questions aims to identify how improvements can be made to improve the chance of winning a tender for EGW. Literature on auction theory by Milgrom will be used. This will give a better understanding of where improvements can be made. Further it will be based on my own insights.
This question is descriptive using secondary sources to gain information. (Cooper & Schindler, 2006)

Chapter 2: Company description

This chapter is meant to give the reader of this report a broad overview of the company EGW d.o.o. It will deal with the history of the company, products, customers and some key financial figures.

History

In 1989 the company Engineering for Gas Technology was formed. In 1993 this company participated in the project called "Heating besieged Sarajevo". The project aimed to distribute, install and service appliances for gas heating for the people of Sarajevo during the war in former Yugoslavia. The equipment for the project was a donation by the Dutch government and because the project was completed in such difficult conditions, the participants were awarded a gold medal by the Netherlands Red Cross Society.
After the war in 1996 out of this group of people the company EGW d.o.o. was formed. It took part in the joint-venture company Brugman BH and became part of the Brugman group. This group consisted of EGW, Brugman BH and EGW Liftovi. In 2006 all the companies in this group together became EGW which now has its own office building and production facility in Blažuj Sarajevo in Bosnia and Herzegovina.
(EGW d.o.o. Sarajevo, WWW)

Products

- Production of consoles for radiators, cabinets for floor heating, hydrants and electric cabinets.
- Sales and representation of various brands that produce equipment for heating, water, sewage and swimming pool systems.
- Designing, constructing and servicing of all types of installations for gas, water, electrics, sewage or HVAC.
- Investment in real estate for further sale.

(EGW d.o.o. Sarajevo, WWW)

At the moment designing and constructing of installations is the most important activity for EGW. This type of product will be the focus of my research because it is sold in tender procedures held by the customer.
Customers want a particular type of installation fitted in their building. That building can be an existing building or one that is still under construction. Projects follow similar series of activities; engineers at EGW make the detailed design based on the global design for the installation made by the customer. Components needed for the installation are ordered from different manufacturers. Everything needed is transported to the site, sometimes by the company's own trucks. At the site EGW employees install the components to make a complete and functioning installation.
If a project requires work that cannot be done by EGW, subcontractors can be hired. For example for civil works a subcontractor is hired.
(Aganović, 2007)
Every year the company performs around 15 large installation projects. This number is only an indication because it very much depends on the size of the projects. Also a large number of small size installation projects are done for individual consumers, mostly related to installing of heating products for which the company does the representation. The large projects all included a tender procedure, the small ones do not. Also these small projects make up less than 5% of the total turnover for installation projects. Therefore this study will exclude the small installation projects.

Most of the company's activities take place in the area around Sarajevo, but could be anywhere in Bosnia and Herzegovina. (Tanović, 2007)

Investment in real estate is a new addition to the company's products. Currently two projects are being built, an apartment building in Bjelašnica and in cooperation with partner companies a municipality hall and shopping centre in Ilidža.
(EGW d.o.o. Sarajevo, WWW)

Customers for installation projects

As mentioned before customers contact EGW because they want a particular installation job done. Customers can be individual consumers, private companies or public companies. Individual consumers usually want smaller jobs done and this group is mainly addressed because it allows EGW to sell products for heating. As already mentioned consumers do not use tender procedures so these customers are not treated in this research.
For clarity this report will use the terms "private customers" and "public customers", although this might not be linguistically correct. Private customers are companies who need a particular type of installation in their own building. For example a hotel might want to have an air-conditioning system installed to keep their guests comfortable in the occasionally hot Bosnian climate. The customer can also be main contractor for a particular project who wants a specific installation job done by a subcontractor. In this case EGW may work as a subcontractor.
Public customers are all those customers who have to adhere to the Public Procurement Law. More about this law and a more precise description can be found in chapter 5 of this report. An example could be a ministry that wants electrical installations done in their new building.

Organization

EGW employs 87 people in total. Part of the employees work in the office in Blažuj, but most work on site on various projects. Employees are grouped in departments by similar skills and tasks from bottom to top of the organization. (Daft, 2001, p.96) So the company has a functional organizational structure.
This also shows in the way decisions are made. They are made at the top level and passed on downwards through the organization.
The organization on site is as follows, on the larger projects there is always a site manager present. A foreman leads a main fitter, who in turn leads a group of fitters who do the actual installation work. These fitters might be assisted by helpers who do not have the same qualifications as the fitters. (Aganović & Tanović, 2007) An organigram can be found in appendix I.

Key financial figures

In 2006 EGW had the following financial figures.

Turnover	5.1 million Convertible Mark (about €2.6 million)
Profit	67 thousand Convertible Mark (about €34 thousand)

(Bilans uspjeha, 2006)

Chapter 3: Internal procedure for preparation of tender proposals

This chapter will deal with describing the business process of the acquisition of new projects through tender procedures. This will give more insight in what the company does. Attention is paid to the individual steps taken within the company to prepare the necessary documentation and all other things required for preparing and sending in a proposal to the customer.

The following steps are taken by EGW employees to prepare a proposal to take part in a tender procedure. Information for this chapter was gathered by interviewing Mr. Aganović. It should be noted that this is only the procedure of what happens internally in the company. The entire tender procedure will be discussed in more detail in chapter 5.

Searching for tender opportunities

In order to find open tenders newspapers are frequently checked as well as websites. There are also e-mail newsletters in which opportunities for tender are advertised. Another possibility is that a customer directly contacts EGW to ask for a proposal.

Decision about whether or not to send in a proposal

As much information as possible is gathered about the tender. There is no formal procedure or formal set of criteria for this decision. It relies largely on the experience of the executive director and director, who together discuss the opportunity. Factors taken into account by them include budget available by customer, the design, equipment to be installed and judgment whether the client might favor a particular competitor. They also check whether EGW is at that moment ready to accept such a tender in terms of available capacity. If this step has a positive outcome the next step is taken.

Dividing tasks

A meeting is held with the employees to inform them of the task they get in preparing the necessary documentation for the tender.

Preparing the proposal

Based on the bill of quantity provided by the customer a quote is made by the commercial department. For each item the price is calculated to include the labor costs. For non-standard equipment suppliers are send a request for quotation. The quotations are compared and the most economical is chosen. Sometimes it is necessary to visit the site where the project is to take place.

Preparing other documents

Customers often request other information about the supplier. They require documents about the registration of EGW in court, documents to prove liquidity, payment of insurances, tax and financial status. More details about this are provided in chapter 6 of this report.

Sending in quote to customer

All necessary documents and proposal are sent to the customer in a sealed envelope.

These steps are summarized in diagram 3.1. It only shows the steps taken by EGW so other companies might have a different approach to organizing this process. An overview of the whole process of a tender procedure is presented in chapter 5 in diagram 5.1.

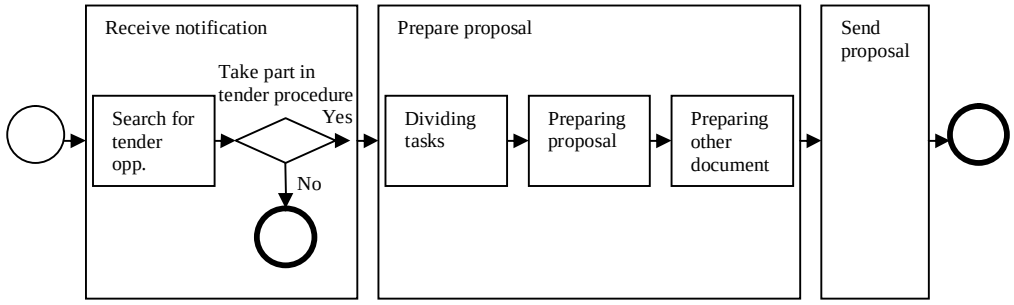

Diagram 3.1

Chapter 4: What types of projects have a significantly different tender success score?

This chapter will answer the research question of what types of projects have a significantly different tender success score. A description is given of how the data was gathered and the subsequent statistical analysis.

To asses whether a particular type of project has a significantly different success score is needed because the outcomes could guide the research on what projects to focus. Now a description of the properties of projects studied is given and an explanation for why they were studied.

Properties of projects studied

1. Customer type (private / public)

Because public customers have to adhere to Public Procurement Laws there might be differences in success score between public and private customers.

2. Months in which the quote was send in

Construction work cannot be done in winter because temperatures in Bosnia are too low. Therefore there might be seasonal influences on success score.

3. Size of the project (measured as the price quoted in a proposal)

There might be a difference between smaller and larger projects in term of success score.

4. Project includes civil works (yes / no)
5. Project includes mechanical installations (yes / no)
6. Project includes electrical installations (yes / no)
7. Project includes gas or water installations (yes / no)

These properties are studied because there might be different competitors depending on the type of work that needs to be done as well as competences by EGW. These might affect success score.

Data collection

A quantitative study was made of proposals that have been sent in to customers in the last 17 months. The time period studied is from January 2006 until May 2007.
This period is chosen as a compromise between choosing a longer time period which would give more reliable statistical results while on the other hand in a shorter period so market trends would not distort the analysis.
Installations for HVAC are recorded here as mechanical installations.

In total 218 proposals were recorded in that period. Internal proposals were filtered out from this list. Secondly the list also included proposals send in to individual consumers for the delivery of mostly heating related products. These projects are fairly small in size. So to filter out this category, projects under 10.000 Convertible Mark were excluded from the analysis. This left a list of 169 projects for which a proposal had been send in.

Some of the data was missing and could not be retrieved with certainty. In table 4.1 there is an overview of the number of missing data for each factor studied. Only project size had a large number of missing values. This might affect the accuracy of the conclusion for the influence project size has on success score.

	1	2	3	4	5	6	7
Factor	Customer type	Month of proposal	Project size	Includes civil work	Includes mechanical installation	Includes electrical installation	Includes gas or water installation
Missing	3	0	44	0	0	0	0

Table 4.1

Analysis

A chi-square model was used to determine if there were any significant differences in success scores. Inputs for the model are the number of successes and failures, for a particular type of project. The model compares the actual number of observed successes with the expected number of successes if there was no significant difference. A 10% unreliability threshold was used.
The eight-step plan for analysis is based on the method described by Kallenberg (2006). The output of SPSS and the exact formulation of the statistical models can be found in appendix II of this report.

Results

Based on the data the following must be concluded:

1. There is no significant difference in success score between tender procedures held by private or public customers.
2. There is no significant difference in success scores between the months in which the proposals were submitted to the customer.
3. There is no significant difference in success score between different sizes of projects.
4. There is no significant difference in success score whether or not a project includes civil works.
5. Projects that include mechanical installations have a larger success score than projects which do not.
6. There is no significant difference in success score whether or not a project includes electrical installations.
7. Projects that include gas or water installations have a lower success score than projects that do not.

Comments on results

These outcomes were discussed with Mr. Aganović. He has some explanations for the significant differences found.
The installation of mechanical works has long been a specialty of the company. Most engineers employed are mechanical engineers. So the level of expertise on this type of projects is very high. Because the long experience they also know their way to finding equipment needed for these projects more economically. Another contributing factor is that the company has been owned by a manufacturer of equipment for heating. That explains the higher success score for this type of projects.

The lower success score for gas and water installations can be explained as follows. The market for gas installations is very small because in Bosnia and Herzegovina infrastructure for gas distribution is not common and only exists in a small number of cities. This might cause the competition to be more intense for the small number of projects that are to be executed.
(Aganović, 2007)

Finally there are differences in success score between different months, however not significant. This partly because there are too few observations in each month, so the difference has to be really large before it shows as significant. In September, October and November the score is higher then in May, June and July. Probably this is related to seasonal effects, in the winter months the tenders procedures are held so construction can start in spring. Therefore demand is likely to be higher.

Conclusion

There is a significantly higher success score for projects that include the installation of mechanical installations and those that do not include gas and water installations.
For these two conclusions plausible causes can be given to explain the results. For mechanical installations it is the high level of expertise and the fact that the company has been owned by a producer of heating equipment. A small competitive market for gas projects explains the lower success score for this type of project.
These groups are still very broad and potentially improvements could be made for both types of projects. Therefore the decision was made to include all the different types of projects in the rest of the research.

Chapter 5: What kind of tender procedures do customers use in selecting a supplier?

This chapter will answer the research question of what kind of procedures customers use in selecting a supplier. The different kinds of customers will be described as well as the role of the Public Procurement Law.

Before any improvements can be suggested to improve the success score in tender procedures it is first required to identify what factors play a role in determining the outcome of a tender procedure.
To answer this question the internet was searched to find a theoretical framework for the tender process. However no theories on this subject were found. Therefore a more practical approach was chosen to determine what could influence tender success.
The most obvious influence is the procedure that customers impose on their suppliers. Therefore this procedure will be examined in more detail.
This chapter deals with what kind of tender procedure is typically organized by public and private customers. A central role in this is played by the Public Procurement Law, of which relevant regulations will be studied in more detail.
Now attention is paid to how private and public customers organize their tender procedures. After that an overview is given of a typical open tender procedure.

Private customers

Typical for this kind of customer is that they do not have any legal obligation to structure their purchase procedure in a particular way. They may choose to contact a single supplier and by negotiation reach a contract. That is mostly what happens for smaller projects. Another possibility is that they organize a tender procedure. This tender procedure is often an open procedure and very similar to those held by public customers. "*The practices and procedures for selecting contractors and awarding contracts in the construction industry are based on those used in the public sector*" (Zedan & Skitmore, 1998, p.1) This is not surprising because they will have the same goal of getting the project completed as economically as possible.
Therefore the open tender procedure is discussed in more detail after the public customers have been treated.
Because private companies are not required to follow the exact same procedure as their public counterparts they may negotiate during the tender process. They can contact a supplier and by discussion reach an agreement on a tender. This could make them less predictable and therefore riskier for suppliers.

Public customers

Public customers are defined as the category of customers who have to adhere to The Public Procurement Law of Bosnia and Herzegovina (PPL). For shortness they will be referred to as public customers. The PPL prescribes what kind of organizations have to adhere to its' rules. These are according to article 3 of the PPL:

- Authorities
- Public entities
- Public enterprises, involved in:
    - Provision of water, electricity or gas
    - Exploiting of geographical area (mining, sea and airport facilities)
    - Operating public transport networks.
    - Operating public telecommunications network.

Legitimating this law is the fact that "*Since those purchases are financed from public funds all public bodies are obliged to follow certain rules and apply procedures which should lead to the choice of the best available tender*" (Guide to awarding public works contracts, 2005, p.5)
The Public Procurement Law aims to make sure "*public funds are used in the most-effective manner with respect to the purpose and the object of the public procurement […] To ensure that fair and active competition among potential suppliers can take place*" (Article 1, PPL)
Rules set in the PPL apply to the choice of procedure, documents, installation of a Procurement Commission, how suppliers should be assessed and evaluated.

The tender procedures most used by public customers for installation works are the open tender procedure and the restricted tender procedure.

- Open tender procedure: A notice is published and any supplier may respond to this by sending in a proposal. From these proposals the customer selects the supplier to which the contract will be awarded.
- Restricted procedure with prequalification: In the first stage of this process a notice is published and any supplier can submit a request for prequalification. In the second stage only selected suppliers from the first stage are asked to send in a proposal. From these proposals the customer selects the supplier to which the contract will be awarded.

Other procedures laid out in the PPL can be found in appendix III as well as a description of those.
The choice of procedure is not free. The standard is an open tender procedure, under specific conditions other types of procedures are allowed. If for example the project is very large or complicated a restricted procedure may be used. Because here suppliers have to qualify first it may save them the cost of extensive preparation of a proposal.

Open tender procedure

As can be concluded form the previous the exact steps taken in a tender process vary depending on the customer. Now an overview is given for what steps are taken in a typical open tender process. This procedure is used by public as well as private customers.

Customer prepares tender documentation

The customer who wants an installation job done prepares the necessary documentation. Often a consulting firm is hired by the customer to make an overall design of a job. This design is called the "main design" and is meant to give an overview of the job, but not all the details that are needed for the actual work.
Besides this a "bill of quantity" is prepared. This document shows what components are needed and in what quantity. Components can be for example pipes, boilers or air-conditioning units.
Also a document with other requirements is prepared. This document contains information about due dates, time of validity of the proposal, how the winning proposal is chosen and other documents that have to be sent in besides the quotation.
All these documents together form the tender documentation.

Customer invites suppliers to tender

The suppliers are informed that the customer wants some kind of installation project performed. This can happen in various ways. If the customer has to comply with Public Procurement Laws a contract notice has to be published in the Official Gazette of BiH. (Guide to awarding public works contracts, 2005, p.34) This notice takes the form of a small advertisement in which the project is described briefly and how interested suppliers can obtain the tender documentation. Often private companies place similar notices in other newspapers.
Besides notices in newspapers these notices can also be on companies or government websites. Also there are newsletters to which supplying companies can subscribe to receive the notices via e-mail.
Private customers can also directly contact several companies to ask for a quotation on a certain project.

Suppliers obtain tender documentation from customer

To get all the information about the tender the suppliers need the tender documentation. A certain amount of money has to be paid by suppliers in order to receive the documents from the customer.

Suppliers prepare the quotation and other documents

This step is done internally by EGW and competing companies. It was described in more detail in chapter 3 of this report. The end result of this step is a proposal that is sent to the customer, in a sealed envelope that is not to be opened before the deadline specified in the tender documents.

Review of the proposals

In this stage the proposals are opened and reviewed. This can be in a public session where only the potential suppliers or representatives can come and see the opening. In this session it is only checked what the price is and if all required documents are present.
After that the submitted proposals are studied for meeting the qualifying criteria and evaluated on the selection criteria. This determines which is the winning proposal and thereby which supplier is awarded the contract. How this is done will be described in more detail in the next chapter.

Notifying the participating suppliers

The suppliers who have sent in a proposal are informed about the outcome of the tender. Public customers are required to do this in writing and show how they came to their decision.

Signing a contract with the winning supplier

The last step is the signing of a contract by the customer with the winning supplier.

This process is summarized in diagram 5.1. The steps taken by the supplier in this diagram were described in more detail in chapter 3 in diagram 3.1. Here specifically EGW's approach to the role of supplier was given, while here in chapter 5 the steps taken by the supplier are kept more general.

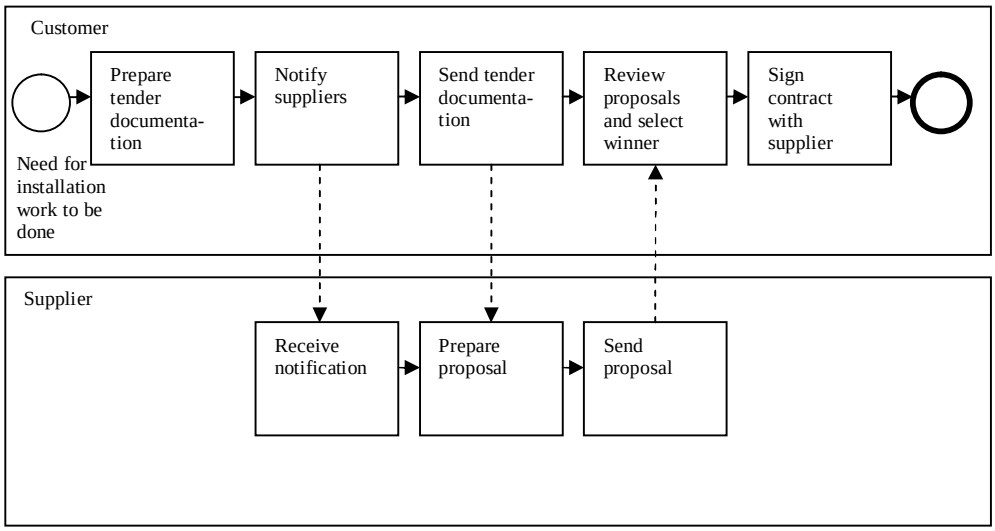

Diagram 5.1

Conclusion

Private customers have are not obliged to organize their procurement in any particular way. This means that they are free to change procedures as they like and to use negotiations in the selection of a supplier. They do however follow procedures similar to those used by public customers.

Public customers need to adhere to the rules set in the PPL. This law defines how the procedure has to be organized and places requirements on what a customer is obliged to do and what is not allowed. Therefore procedures cannot be changed and negotiations are prohibited.

The open tender procedure is commonly used, although variations on this type of tender procedure are possible.

Chapter 6: How does the tender procedure affect tender success score in theory?

This chapter will answer the research question of how the procedure affects the tender success in theory. The procedure is examined for potential causes of failure and this will form the framework for further analysis.

The previous chapter identified what procedure is most commonly used by customers in selecting their suppliers through a tender process. Now it is time to have a look how this would affect the success of a proposal send in. This is done by identifying potential problems that might lead to losing the tender procedure.
The starting point for this is the tender procedure as it is organized by customers. In this procedure decisions are made by the customer about which supplier will be awarded the contract. These are points where a potential supplier might not be chosen and could therefore be a potential cause for not winning in a tender procedure. This list of causes might not include all possible causes because it takes the tender procedure as a starting point and only causes that could be affected by the supplier.
To be sure that no major cause was omitted a search was done on the internet. There is fair number of sites which are meant to provide suppliers with tips and advice for enhancing their success when participating in tender procedures. These websites focus on the tender procedure from a very practical point of view.
Also the focus is on problem areas that can be affected by the supplier. Because EGW is a supplier it is only useful to study potential problem areas where a supplier's action could change the outcome of a procedure.

This search revealed that there are three potential problem areas. First the suppliers quote might be rejected by the customer because it is not compliant with the procedural requirements. Secondly the quote or supplier company does not meet (pre)qualifying criteria. Thirdly the quote is accepted but the supplier is not chosen by the customer on selection criteria.
The last two are both about not meeting up criteria set by the customer. However it is needed to make a distinction between them because there is a fundamental difference. On the selection criteria a proposal can only pass or fail, the selection criteria determine the score of the proposal. This is confirmed by the PPL: "*criteria related to personal situation of a candidate (like financial and economic standing, experience, staff, etc) which are used in pre-qualification, can be never used for selection of best tender*" (FAQ, WWW).

Non-compliant proposal

A proposal that is not compliant with the format or procedure prescribed in the tender documentation is rejected from the procedure. *"Only tenders that conform to stated tender requirements will ever even begin to be assessed."* (Tender tips, WWW) There are a number of ways in which a proposal can be non-compliant. Below two types of non-compliance are identified.

Incomplete proposals

The previous chapter showed that customers need to asses their suppliers to ensure that they will choose one that is capable of performing well. For public customers this is even an obligation to asses the suppliers reliability, economic and financial status and professional ability.

To be able to asses the supplier the customer requires additional information besides the quoted price. To obtain this information often asks for additional documents. A list of documents that are often required by customers can be found in appendix IV.
"Business organizations are often asked to submit additional documents - such as judicial records, bank statements/reference and tax certificates to the contracting authority during the procurement process. One issue that often arises is a failure to submit that information."
(Report on questionnaires received from contracting authorities and the business community on public procurement practice in Bosnia and Herzegovina, 2007, p.13)
So in conclusion proposals need to be complete before the customer will even asses them. Failure to do so leads to a rejection of the proposal.

Not meeting deadlines

This one is fairly obvious, proposals not meeting the deadlines set out in the tender notice usually will not be considered by the customer. The tender documentation always states dates and times for when tender documentation can be obtained and when proposals have to be submitted.
Private customers could make exceptions to the deadlines they have set, because they are not bound by the Public Procurement Law. However they probably would not do that because when a supplier cannot meet the deadline for tender procedure it is questionable if the supplier can complete the works in time.
Public customers cannot make exception to deadlines because in doing so they might harm fair competition. Therefore it is forbidden to accept any proposal after the deadline as article 13 of the Implementation Regulation states.
A guide from the UK government further supports this point. "*When tendering for a public-sector contract, you will be given deadlines to get information and documents to the customer. These deadlines are important and you should make sure you meet all requests on time.*" (Tendering for government Contracts: a guide for small businesses, p.10)

Supplier or proposal does not meet (pre)qualifying criteria

The previous group of reasons was mainly about not being compliant with procedures. This group concerns with the proposal or supplier company not meeting qualifying criteria. This may be discovered in a prequalification round in a restricted procedure with pre-selection or in the final stage of an open procedure.

The customer want to make sure that the supplier he chooses is reliable and capable to complete the project. Also the customer needs to make sure that the chosen supplier will do the project for the amount of money and according to the conditions in the proposal. Therefore the customer needs to have information about the suppliers. Both private and public customers state criteria on the following dimensions. In fact public customers are obliged by the law to make such an evaluation. (Guide to awarding public works contracts, 2005, p.47)

Technical and professional ability of supplier

Suppliers must show evidence that they are technically and professionally capable to complete a project. Criteria to asses this will often be:

- Previous projects carried out over a specified past period of time and the proof that this was done to properly.
- Educational and professional qualifications of supplier's employees.
- Number of people employed in a specified past period of time.
- Technical equipment available to supplier.
- Supplier's intentions to subcontract any work.

(Guide to awarding public works contracts, 2005, p.50)

Economic and financial position of supplier

It is in the customer's interest that the supplier he chooses is economically and financially in a good position. Criteria used frequently are:

- Turnover for specified number of past years.
- Financial results for specified number of past years.
- Proof of banks and insurance.

(Guide to awarding public works contracts, 2005, p.49)

Reliability of supplier

A supplier will not be chosen if he has one of the following characteristics:

- In the process of bankruptcy
- Is convicted of any offence or grave professional misconduct
- Does not pay all needed taxes

(Guide to awarding public works contracts, 2005, p.48)

In conclusion a potential supplier has to satisfy all qualifying criteria before his proposal is considered.

Proposal does not win on selection criteria

The last possibility is that a proposal does not win the selection for best proposal. Private companies may have many different ways of selecting the best proposal. Public companies have two options.

- The most economically advantageous proposal based on previously set selection criteria.
- Lowest price.

(Article 34, PPL)
Criteria commonly used for selecting the most economically advantageous proposal include quality, price, technical merit, functional and environmental characteristics,
running costs, cost-effectiveness, after-sales service and technical assistance,
delivery date and delivery period or period of completion. (Guide to awarding public works contracts, 2005 p.53)

The whole chapter is summarized in the diagram 6.1. The three identified potential problem areas present situation in which a decision can be made that influences the outcome of the tender procedure. The decisions are represented by the diamond shape. Arrows indicate the flow through this diagram.
Tenders that are won go through the diagram and end in the circle on the right, representing a won tender. A tender is lost if it ends up in one of the bottom circles. It is to be noted that this diagram shows in more detail what happens in the step "review proposals and select winner" in diagram 5.1

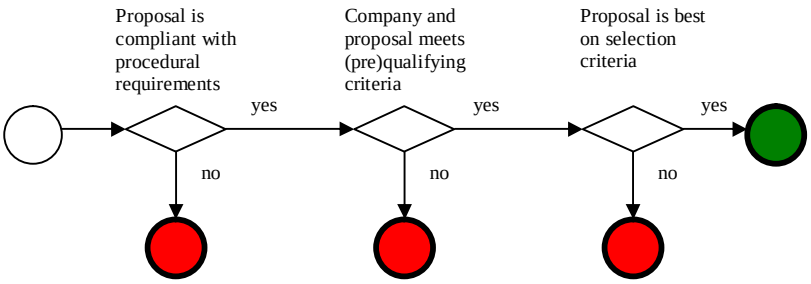

Diagram 6.1

The decisions outlined in this diagram will be the basis for further analysis of the situation in the next chapter. So next will be examined whether non-compliant proposals, rejection on prequalification criteria or selection criteria is the reason why tender procedures are lost.

Conclusion

The tender process organized by the customer has an influence on tender success because in this procedure the winning tender is selected. There are three possibilities in the process where the procedure can be lost for an individual proposal. The proposal can be not compliant, the company or proposal can be rejected because of not meeting prequalification criteria or the proposal is not chosen in based on the selection criteria.

Chapter 7: How does the tender procedure affect tender success score in practice?

This chapter deals with the results of the case study of several tender procedures. It will discuss how these were analyzed and what caused these proposals to be rejected. Also the background of these reasons will be discussed to give a complete picture of these problems.

In order to identify the problems that EGW faces when competing for winning tenders a study was made of a number of cases in which the company participated in the tender procedure. Data was collected by studying a number case in which EGW had submitted a proposal for a project. A list of the projects studied can be found in appendix V of this report. The problem was that only in a few occasions the customer prepared a detailed report of the outcome of the tender. Most frequently only the name of the winning supplier is made public.

The outcomes of this study were categorized in the framework set out in the previous chapter.

Non-compliant proposal

None of the proposals that were studied was rejected because of it being not compliant with the procedural requirements. According to Mr. Aganović it is exceptional that their proposals are rejected for this reason. Only 1 or 2 two cases occurred in the last 1.5 years.
The study of documents showed a few occasions competitor's proposals were rejected for being not compliant, because not all the required documents had been sent in.

Supplier or proposal does not meet (pre)qualifying criteria

None of the proposals studied were rejected because of not meeting qualifying criteria.

Proposal does not win on selection criteria

The most likely cause found for not winning in a tender procedure is not scoring best on selection criteria.

Not all customers are completely open how they calculate which proposal is the winner. In the documents studied of those who were, they use a form of multi-criteria analysis to determine which proposal wins the tender procedure. A multi-criteria additive utility function is used. (Zedan & Skitmore, 1998, p.8) The value or utility of each proposal is the sum of the relative weight multiplied with the utility.

$U_i = {}^{m}_{j}\sum w_j \times U_{ij}$
where
U_i is the utility of proposal i
w_j is the weight of criterion j
U_{ij} is the utility of proposal i on criterion j
m is the number of criteria

The utility on a criterion is determined by comparing it to the best score on that criterion.
$U_{ij} = S_{ij} / S_{best\ j}$
where
S_{ij} is the score of proposal i on criterion j
$S_{best\ j}$ is the score of the best proposal on criterion j
(Based on Zedan and Skitmore, 1998)

Each criterion is given a different weight. In table 7.1 an overview is given of the selection criteria used, the range of their weights and a description.

Weight	Criterion	Description
45 – 60	Price	The price quoted for completing the project as described in the tender documentation.
10 – 20	References	References showing capability of the supplier. Eg. number of similar projects completed in the last three years.
5 – 20	Time to complete	Time quoted to complete the project described in the tender documentation.
5 – 10	Payment conditions	Depends on the if there has to be an advance payment and in how often payments need to be made.
0 -30	Technical characteristics	Technical characteristics of the proposal send in.
0 – 10	Warranty	Time of warranty on installation and equipment.

Table 7.1

Per criterion an overview is given for its effect on tender success by EGW.

Price

A too high price in comparison to competitors was the main reason for not winning a tender procedure. This observation is confirmed by the executive director. Often the price difference was small but on some projects the price quoted by EGW was up to 30% higher than the price of the winning proposal.

References

This is not a problem. If references are included in the selection criteria EGW very frequently scores well on this. Competitors also score well on this criterion so EGW has no advantage on this selection criterion.
However one customer demanded that his suppliers are ISO 9001:2000 certified. EGW does not have such certification yet. So in this case study one tender procedure was lost because of the lack of ISO certification.

Time to complete

On this criterion EGW scores well. The time needed to complete is often the shortest compared to competitors.

Payment conditions

Most of the time EGW has about the same score as competing companies.

Technical characteristics

Similar scores to competitors.

Warranty

In most cases the score on warranty is very similar to those of competitors. This is not surprising because this is dependent on the warranty terms offered by the manufacturers of the installed equipment.

Conclusion

In all cases in which a tender procedure was lost this was due to the proposal not being chosen based on the selection criteria.
Non-compliant proposals or not meeting pre-qualification criteria were not responsible for EGW losing tenders. Therefore there is no reason to adjust procedures but attention should be paid to the selection criteria.
Of the selection criteria the criterion price is a very important. Price is given a lot of weight in the multi-criteria analysis used for making decisions. Therefore price is very frequently the determinant of which proposal wins. Most proposals lost by EGW were caused by scoring not good enough on the criterion price.

Chapter 8: How are tender proposals priced by EGW and the industry in general?

This chapter will answer the question of how proposals are priced, by EGW and in the construction industry in general. This is then applied to the findings of the previous chapter.

Tender procedures are set by the customers. Of the potential problem areas not winning on selection criteria was the main cause for not winning tender procedures. The most important and sometimes only selection criterion is price as the previous chapter showed. This was the main cause why EGW is losing tender procedures.
It is therefore needed to have a look how EGW determines its pricing and how prices are generally set in construction industry. There is a trade-off between pricing higher to increase revenue and stating a lower price to increase the chance of winning.

Price setting in construction industry

Skitmore and Xinling (2006) begin their study with the notion that there are two contradictory approaches to price setting in the construction industry. Those pricing strategies can be either cost-based or market-oriented. Drury (2000) makes the same distinction where he calls them cost-plus pricing and economic theory.
We will now look at how both practices fit in with the practices used in everyday pricing in construction industry.

Cost-based pricing

Cost-based pricing is setting prices in order to recover production costs and make a certain amount of profit. Costs are determined on base of absorption costing and a markup is added to earn a target rate of return. (Drury, 2000, p.389)
The cost-based pricing strategy is the standard practice in industry. This fits in with the procedure that when a proposal is made, for each item on the bill of quantity a cost is to be filled in.
It is a way of pricing that finds plausible prices with ease and speed. The computations look factual and precise so it is not hard to defend the outcome of the pricing procedure. (Drury, 2000, p.390)
If cost structures are similar for competing firms in an industry, the use of cost-based pricing will allow the firm to predict competitor's prices. (Drury, 2000, p.390) This is because costs will be mostly the same and markup can be determined by observing the prices quoted by competitors, which will be made public in most tender procedures.
If all suppliers use this approach to set their price in tender procedures, this means that the winner is the supplier who has the lowest estimation of costs or is willing to set the markup the lowest.

Market-oriented pricing

Market-oriented pricing means setting a price in such way that profit is maximized taking in account that the demanded quantity depends on price. (Skitmore & Xinling, 2006, p.4)
This theory states that prices are set by supply and demand. If demand is high, prices will rise and visa versa. This means that in construction industry prices are set by the market and not by the individual suppliers. This is making the individual suppliers "price takers".

On the short term this means that when bidding only incremental costs should be taken in consideration for a firm as a price taker. (Drury, 2000, p.385) This also explains some of the behavior of competing suppliers. *"Contractors, when faced with a shortage of work, are more likely to enter low bids simply to stay in business in the short term and in the hope of somehow raising additional income through 'claims' or cutting costs to compensate.*" (Zedan & Skitmore,1998, p.2)
In conclusion suppliers price their proposals according to what they think is the highest price accepted by the market. The winner will be the supplier with the lowest estimate.

In practice these two approaches to setting prices are two opposite ends of the spectrum. There are many forms in between. Drury (2000, p.390) states *"the actual price that is calculated by the formula is rarely adopted without amendments. The price is adjusted upwards or downwards after taking account of the number of sales orders on hand, the extend of competition form other firms, the importance of the customer in terms of future sales, and the policy relating to customer relations."*
This means that costs are used to calculate a base price. Afterwards a correction is made to factors of competition and customers, effectively adjusting the price to the market. In line with this is the conclusion by Skitmore and Xinling (2006, p.25) that construction firms are market-aware and estimate both costs and market price in determining prices for their products.

Price setting by EGW

According to Mr. Aganović prices are set by estimating costs. Cost estimates are made based on the bill of quantity drawn up by the customer. As was described in chapter 3, for each item a purchase cost is estimated as well as a price for the labor hours needed to install it.
Cost structures for the installation of systems are very similar for different firms. All of them have to buy the same type of equipment to be installed because that is specified in detail in the tender documentation. Usually these costs are the largest costs of a project by far, making up 75% of costs or more. (Aganović, 2007) Also all of them incur about the same labor costs for installing those components. The cost structure of a typical installation project can be found in appendix VI.

On top of the labor costs is a factor to include the overhead costs the company has in the price of the project. This would suggest the use of a blanket overhead rate, where the *"costing system assigns indirect costs to cost objects using a single overhead rate for the organization as a whole.*" (Drury, 2000, p.50) These overhead costs are assigned to different projects based on the labor costs of these projects.
However this is not entirely true because this factor is varied for different sizes of projects and depending on competition by other suppliers. So effectively by using this factor an adjustment is made for market conditions.
In conclusion the pricing system used by EGW takes both costs and market conditions in consideration.

These theories for price setting can also shed light on the price differences found between EGW and winning suppliers in the tender procedures studied in the previous chapter.
In most cases the price difference between the winning proposal and the one send in by EGW were small. This is to be expected when all competitors use a pricing system based on costs. Because costs structure of competing companies is approximately the same, the prices based on costs will also be in the same range. Differences would be explained by differences in cost estimates, and therefore by cost-based pricing.

There were also a few cases in which the price difference was large, sometimes up to 30%. There must be some market-oriented pricing because the difference is too large for a difference in cost estimates. It might be that competitors price their product just to cover the incremental costs and therefore offer a price that is much lower. This is in keeping with the theory of market-oriented pricing.

Conclusion

Pricing proposals in a tender procedure is a trade-off between revenue and the chance of winning a tender. EGW prices proposals based on costs of the labor and purchasing of the needed equipment. An adjustment is made in the assignment of overhead costs to adjust the price of the proposal to market conditions.
This is in line with the practices used in the industry, where price setting is cost-based but also adjusted to market conditions.
This practice might be a threat for EGW because market price levels might become so low that they no longer cover the costs. The market is highly competitive at the moment and with the large price differences found, it is very well possible that prices sometimes are already below the level of the actual costs.

Chapter 9: What improvements can be made to improve the tender success score for EGW?

This chapter discusses what improvements are possible that improve the chance of winning a tender procedure for EGW.

Up to now this research showed that customers set the procedures in the tender process. Of the potential problem areas, not winning on selection criteria was the main cause for not winning in tender procedures. The most important and sometimes only selection criterion is price. This is also the main cause why EGW is losing tender procedures. Therefore the previous chapter examined price setting by EGW and in the industry in general. The price stated in proposals is based on both the expected costs and adjusted for competition. Therefore price setting involves a judgment by the suppliers involved. Suppliers might have certain strategies to make this judgment and therefore the suppliers' behavior is important for the tender outcomes.
In literature auctions and the behavior of participants have been studied. Tender procedures can be modeled as a sealed-bid auction where each buyer in private determines a price which he is prepared to pay for goods. Therefore theory on auctions can be applied to tender procedures. In a tender procedure it is the lowest price for which a seller wants to sell his goods. An optimal bidding strategy can not be specified because "*the profit-maximizing bid in these auctions depends on what bids the competitors make.*" This according to Milgrom (1989, p.8) where he elaborates on sealed-bid auctions in his desertion about auction theory.

There are however a few things that should be considered. "*The most important lessons to be learned from both theory and the experiments are that the returns in bidding come from cost and information advantages*" (Milgrom, 1989, p.6)
The first point made here is the most obvious one; cost advantages. If EGW was to have lower costs than its competitors it is clear that tenders could be won more easily because prices could be set lower than the competitor's price without affecting profit margins.
The cost-structure for installation products is however very similar for all competitors so it will be hard to achieve lower costs than competition. However this should not discourage a thorough focus on keeping the cost down.
The second point made about information advantages deserves some thought. Information about many things is needed for winning tender procedures but might not be obtained easily. Information about cost and competitors is needed for setting a right price for the proposal.

Cost information

Information about cost can be gathered mostly internal or by contacting suppliers of equipment. Good and accurate knowledge about cost is vital in winning tender procedures. *"[…] the payoff to careful cost estimation in competitive bidding is great, because it allows you to bid aggressively without great risk*." (Milgrom, 1989, p.6)
The point made by Milgrom is that bids can be made lower without increasing the risk of making a loss if the estimation of cost is correct. As was demonstrated earlier price is a very important determinant in the chance of winning a tender so if the price can be reduced this is a clearly would improve the tender success score.
Therefore there should be a continuous check if the costs quoted match the actual costs in a project, both on the costs of purchased equipment as well as on the costs of labor. There should be a standard procedure how to evaluate the costs of each project and how to record them for future use in making a proposal.

Competitive information

At the moment most of the information about competition and market trends is not recorded formally. The director and executive director have a vast amount of experience in tender procedures and the industry so there has not been an urgent need to record much information formally.
There are however benefits to a more structured way of recording information. It will help to recognize trends in demand and identify where improvements should be made. So for all proposals submitted record should be kept of their outcome, reasons or any other relevant information.

Conclusion

Information and cost advantages are important to gain a competitive advantage in tender procedures. Paying attention to both is needed to improve the success score in tender procedures.
Cost advantages can be hard to attain because of the similar cost structure of the competing companies.
Information about costs and competition should be recorded carefully and be used to set prices, identify opportunities and market trends.

Chapter 10: Conclusions and recommendations

This chapter states the conclusions and recommendations based on the research. This gives an answer to the problem formulated in the first chapter. Besides these conclusions recommendations are made based on the conclusions. Also it broadly describes how these could be implemented.

Conclusions

The aim set out for the research was to provide recommendations so that the tender success score for EGW can be improved. The success score for different types of projects in tender procedures showed few significant differences. Projects including mechanical installations had a higher success score as well as projects not including gas and water installations. These differences were most likely due to the former shareholder of the company and market conditions. Therefore the decision was made not to focus on a particular type of project.
Procedures are very important for the acquisition of orders in this industry. Public and private customers follow tender procedures that are quite similar, most commonly an open tender procedure. However public customers have to adhere to the rules on tenders set in the Public Procurement Law, thereby limiting the choices of procedure and possibility of negotiations.
From the most commonly used procedures follows that in theory a tender procedure could be lost in three ways. The proposal can be not compliant, the proposal may be rejected because the company or proposal does not meet prequalification criteria or the proposal is not chosen on the selection criteria.
In practice in almost all cases a tender procedure is lost because the proposal is not chosen on basis of the selection criteria. Incompliant proposals or not meeting selection criteria are not the cause for losing tender procedures. Therefore they were not studied further and there is no reason to adjust the procedure for preparing tender proposals. Price is the most important selection criterion used by customers and it causes most lost tender procedures for EGW.
Prices in construction industry are set based on costs, however the quoted price is adjusted for market conditions. EGW uses a similar method.
In order to increase tender success score EGW should have a cost or information advantage. Because of the similar cost structure of competing firms a cost advantage is hard to attain.

Recommendations

Record should be kept of the outcome of the tender procedure for each proposal that is sent in. This to gain competitive information to detect market trends or any problems that may occur. This could be done by using a database to record the details of the tender procedure and proposal. Analysis should be done at regular intervals. Attention should be paid to market price levels, what number of proposals is send in, how many tender procedures are won, if any particular type of project has a different success score and what the reasons are for not winning and competitors. Results need to be discussed with the management to solve any problems or to develop strategies for coping with these market trends.

Improvements should be made to ensure accuracy of cost data. This should be done on two aspects; making sure costs for activities are accurate and that costs are allocated to projects reflect their actual costs.

The first could be done by setting standard costs for all activities performed in installation projects. These standards should be used in making proposals. After completion of a project an evaluation must be made to asses if the standards are still accurate. This requires making a calculation of the project's costs at the end in a similar format as is done in the planning at the beginning. Analysis should be made of both costs and quantity used. Comparing the actual costs with the standard costs should show whether the standard costs are accurate or need to be updated. Ideally standard costs should be maintained in a single database that is accessible to people working to make the proposals as well as in the finance department.

Secondly costs must be allocated correctly. The better the costs estimates reflect the actual costs of a project the less risk there is. Especially the allocation of overhead costs deserves more attention in this aspect. Time spent by engineers working on a project and also the costs of supervising personnel should be allocated to that project and not be included in the general overhead of all projects. This also holds good for transportation costs.
This requires estimations of these costs when a proposal is made and for the engineers and supervisors to record the hours spent on a project. Also transportation costs should be recorded on a per project basis. After some time it should be possible to set standards for these costs as well. This will require changes in the accounting software and in the procedure for making proposals.

The creation of standard costs for all operations and correct allocation of costs allows for better performance evaluation. In this way it is possible to identify activities that deserve improvements and it can be motivating for employees to know that their performance is measured. Improvements in performance results in lowering of costs, by which proposals can be priced lower so the success score in tender procedures is improved.

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Company documents

- Bilans Uspjeha za period od 01.01 do 31.12.2006 godine (profit and loss account)

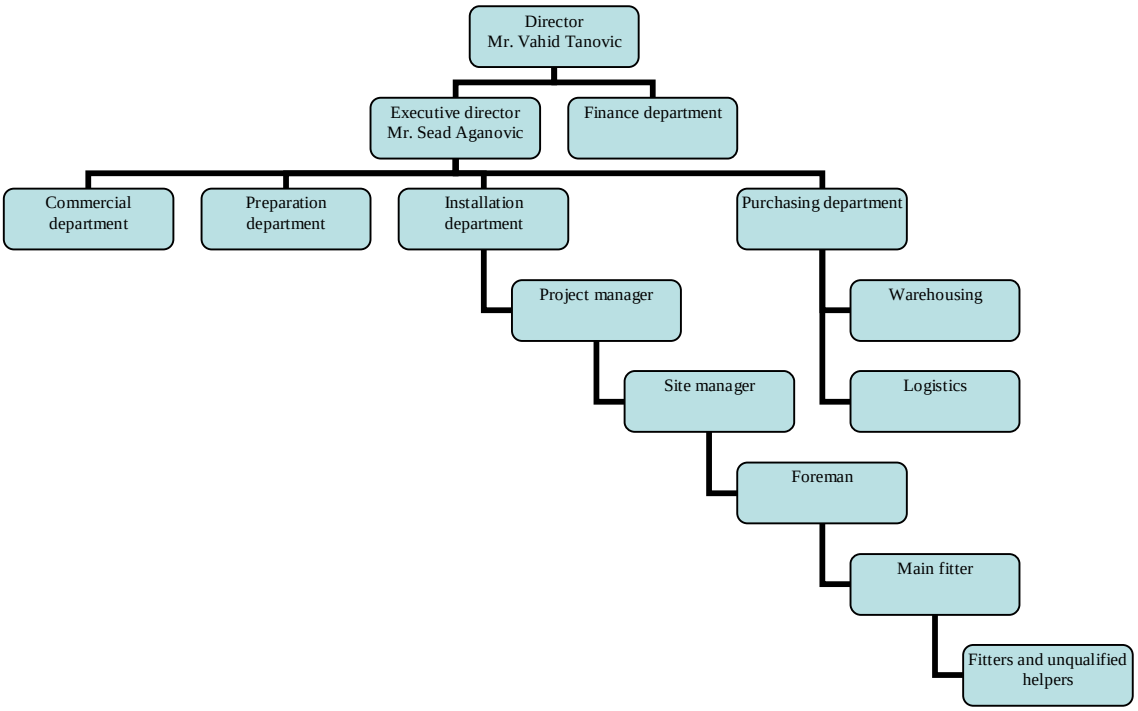
Interviews

- Mr. V. Tanović, director
- Mr. S. Aganović, executive director
- Ms. J. Mulamekić, company lawyer

Photos

- Front page: Bjelašnica real estate project, taken July 6, 2007
- Second page: Installations in Bosmal City Center, taken May 10, 2007

Appendix I: Organigram EGW d.o.o.



(Aganović and Tanović, 2007)

Appendix II: Statistical analyses on proposals send in between January 2006 and May 2007

This statistical analysis is done based on the approach outlined by Kallenberg (2005). This is an eight step plan for statistical analysis. Each question is analyzed in this way.
An unreliability threshold of 10% was chosen for all cases.

On the following pages the output of SPSS can be found as well as a description of the statistical model that was formulated for each case.

Does the success score in tender procedures differ for public and private customers?

Below the SPSS output is shown for cross tables.

Employer type * Tender outcome Crosstabulation

Count

		Tender outcome		
		Lost	Won	Total
Employer type	Private	79	13	92
	Public	62	12	74
Total		141	25	166

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,139(b)	1	,709		
Continuity Correction(a)	,024	1	,877		
Likelihood Ratio	,139	1	,709		
Fisher's Exact Test				,828	,436
Linear-by-Linear Association	,139	1	,710		
N of Valid Cases	166				

a Computed only for a 2x2 table

b 0 cells (,0%) have expected count less than 5. The minimum expected count is 11,14.

1

Model: "Private" is seen as the first sample and "Public" is the second sample. X is defined as the number of won tenders in group "Private" and Y is the number won in group "Public". Suppose: X,Y are independent stochastic variables, $X \sim B(92,p_1)$ and $Y \sim B(74,p_2)$ with $0 \leq p_1,p_2 \leq 1$ being unknown parameters.

2

H_0: $p_1=p_2$

H_1: $p_1 \neq p_2$

3

Unit of test X^2

4

As H_0 is true X^2 is distributed chi-square approximately with one degree of freedom.

5

Value of unit of test $X^2 = 0.139$ (from SPSS output)

6

Critical value is 2.71 (Chi kwadraat verdeling from Kallenberg, 2005) and the critical area is $X^2 \geq 2.71$

7

H_0 is not rejected because $0.139 < 2.71$

8

Based on this data there is no reason to conclude that the chance of success in a tender process differs in tenders by private or public companies.

Does the success score in tender procedures differ for different months?

Below the SPSS output is shown for cross tables.

Month * Tender outcome Crosstabulation

Count

		Tender outcome		
		Lost	Won	Total
Month	1	18	2	20
	2	22	2	24
	3	18	3	21
	4	18	3	21
	5	17	1	18
	6	5	0	5
	7	8	1	9
	8	4	1	5
	9	9	3	12
	10	10	4	14
	11	8	3	11
	12	7	2	9
Total		144	25	169

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8,312(a)	11	,685
Likelihood Ratio	8,754	11	,645
Linear-by-Linear Association	4,824	1	,028
N of Valid Cases	169		

a 14 cells (58,3%) have expected count less than 5. The minimum expected count is ,74.

1

Model: $(N_{1\,1},\ldots,N_{1\,12}),(N_{2\,1},\ldots,N_{2\,12})$ are independent stochastic vectors.
$(N_{i\,1},\ldots,N_{i\,k}) \sim$ multinomial $(n_i, p_{i\,1},\ldots,p_{i\,12})$ distributed i=1,…,r with $p_{1\,1},\ldots,p_{2\,12}$ being unknown parameters.

2

H_0: $(p_{1\,1,\ldots,}\ p_{1\,12}) = (p_{2\,1},\ldots,\ p_{2\,12})$
H_1: $(p_{1\,1,\ldots,}\ p_{1\,12}) \neq (p_{2\,1},\ldots,\ p_{2\,12})$

3

Unit of test X^2

4

As H_0 is true X^2 is distributed chi-square approximately with 11 degrees of freedom.

5

Value of unit of test X^2= 8.312 (from SPSS output)

6

Critical value is 17.3 (Chi kwadraat verdeling from Kallenberg, 2005) and the critical area is $X^2 \geq 17.3$

7

H_0 is not rejected because 8.312 < 17.3

8

Based on this data there is no reason to conclude that the chance of success in a tender process differs in the various months.

Problem

The problem with this test is that the number of observations in the table is less than 5 for some months. This might have an effect on reliability of the test, because the Chi squared distribution might no longer be a valid assumption in this case.

Does the success score in tender procedures differ for different sizes of projects?

Below the SPSS output is shown for cross tables.

Price Cat. * Tender outcome Crosstabulation

Count

		Tender outcome		
		Lost	Won	Total
Price Cat.	0 - 50.000	34	7	41
	50.001-100.000	14	4	18
	100.001 - 500.000	36	5	41
	500.001 >	22	3	25
Total		106	19	125

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1,286(a)	3	,732
Likelihood Ratio	1,242	3	,743
Linear-by-Linear Association	,616	1	,433
N of Valid Cases	125		

a 2 cells (25,0%) have expected count less than 5. The minimum expected count is 2,74.

1

Model: $(N_{1\,1},\ldots,N_{1\,4}),(N_{2\,1},\ldots,N_{2\,4})$ are independent stochastic vectors.
$(N_{i\,1},\ldots,N_{i\,k}) \sim$ multinomial $(n_i, p_{i\,1},\ldots,p_{i\,4})$ distributed i=1,…,r with $p_{1\,1},\ldots,p_{2\,4}$ being unknown parameters.

2

H_0: $(p_{1\,1,\ldots,}\ p_{1\,4}) = (p_{2\,1},\ldots,\ p_{2\,4})$
H_1: $(p_{1\,1,\ldots,}\ p_{1\,4}) \neq (p_{2\,1},\ldots,\ p_{2\,4})$

3

Unit of test X^2

4

As H_0 is true X^2 is distributed chi-square approximately with 3 degrees of freedom.

5

Value of unit of test X^2= 1.286 (from SPSS output)

6

Critical value is 6.25 (Chi kwadraat verdeling from Kallenberg, 2005) and the critical area is $X^2 \geq 6.25$

7

H_0 is not rejected because 1.286 < 6.25

8

Based on this data there is no reason to conclude that the chance of success in a tender process differs for different sizes of projects.

Problem

The problem with this test is that the number of observations in the table is less than 5 for some months. This might have an effect on reliability of the test, because the Chi squared distribution might no longer be a valid assumption in this case.

Does the success score in tender procedures differ whether a project includes civil works?

Below the SPSS output is shown for cross tables.

Civil works * Tender outcome Crosstabulation

Count

		Tender outcome		Total
		Lost	Won	
Civil works	Does not include civil works	121	20	141
	Includes civil works	23	5	28
Total		144	25	169

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,250(b)	1	,617		
Continuity Correction(a)	,044	1	,835		
Likelihood Ratio	,240	1	,624		
Fisher's Exact Test				,571	,400
Linear-by-Linear Association	,249	1	,618		
N of Valid Cases	169				

a Computed only for a 2x2 table

b 1 cells (25,0%) have expected count less than 5. The minimum expected count is 4,14.

1

Model: "No civil works" is seen as the first sample and "Civil works" is the second sample. X is defined as the number of won tenders in group "No civil works" and Y is the number won in group "Civil works".

Suppose: X,Y are independent stochastic variables, $X \sim B(141,p_1)$ and $Y \sim B(28,p_2)$ with $0 \leq p_1,p_2 \leq 1$ being unknown parameters.

2

H_0: $p_1=p_2$

H_1: $p_1 \neq p_2$

3

Unit of test X^2

4

As H_0 is true X^2 is distributed chi-square approximately with one degree of freedom.

5

Value of unit of test $X^2= 0.250$ (from SPSS output)

6

Critical value is 2.71 (Chi kwadraat verdeling from Kallenberg, 2005) and the critical area is $X^2 \geq 2.71$

7

H_0 is not rejected because $0.250 < 2.71$

8

Based on this data there is no reason to conclude that the chance of success in a tender process differ whether or not a project includes civil works.

Does the success score in tender procedures differ whether a project includes mechanical installations?

Below the SPSS output is shown for cross tables.

mechanical * Tender outcome Crosstabulation

Count

		Tender outcome		
		Lost	Won	Total
mechanical	Does not include mechanical installations	56	5	61
	Includes mechanical installations	88	20	108
Total		144	25	169

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3,295(b)	1	,069		
Continuity Correction(a)	2,527	1	,112		
Likelihood Ratio	3,563	1	,059		
Fisher's Exact Test				,076	,052
Linear-by-Linear Association	3,275	1	,070		
N of Valid Cases	169				

a Computed only for a 2x2 table

b 0 cells (,0%) have expected count less than 5. The minimum expected count is 9,02.

1

Model: "No mechanical installation" is seen as the first sample and "Mechanical installation" is the second sample. X is defined as the number of won tenders in group "No mechanical installation" and Y is the number won in group "Mechanical installation".
Suppose: X,Y are independent stochastic variables, $X \sim B(61,p_1)$ and $Y \sim B(108,p_2)$ with $0 \leq p_1,p_2 \leq 1$ being unknown parameters.

2

H_0: $p_1=p_2$
H_1: $p_1 \neq p_2$

3

Unit of test X^2

4

As H_0 is true X^2 is distributed chi-square approximately with one degree of freedom.

5

Value of unit of test $X^2 = 3.295$ (from SPSS output)

6

Critical value is 2.71 (Chi kwadraat verdeling from Kallenberg, 2005) and the critical area is $X^2 \geq 2.71$

7

H_0 is rejected because $3.295 > 2.71$

8

Based on this data it can be concluded that the chance of winning in a tender process differs between projects that do not include mechanical installations and ones that do.
Apparently projects that include mechanical installations are won more often.

Does the success score in tender procedures differ whether a project includes electrical installations?

Below the SPSS output is shown for cross tables.

Electrical * Tender outcome Crosstabulation

Count

		Tender outcome		
		Lost	Won	Total
Electrical	Does not include electrical installations	82	14	96
	Includes electrical installations	62	11	73
Total		144	25	169

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,008(b)	1	,930		
Continuity Correction(a)	,000	1	1,000		
Likelihood Ratio	,008	1	,930		
Fisher's Exact Test				1,000	,549
Linear-by-Linear Association	,008	1	,930		
N of Valid Cases	169				

a Computed only for a 2x2 table

b 0 cells (,0%) have expected count less than 5. The minimum expected count is 10,80.

1

Model: "No electrical installation" is seen as the first sample and "Electrical installation" is the second sample. X is defined as the number of won tenders in group "No electrical installation" and Y is the number won in group "Electrical installation".

Suppose: X,Y are independent stochastic variables, $X \sim B(96,p_1)$ and $Y \sim B(73,p_2)$ with $0 \leq p_1,p_2 \leq 1$ being unknown parameters.

2

H_0: $p_1=p_2$

H_1: $p_1 \neq p_2$

3

Unit of test X^2

4

As H_0 is true X^2 is distributed chi-square approximately with one degree of freedom.

5

Value of unit of test $X^2 = 0.008$ (from SPSS output)

6

Critical value is 2.71 (Chi kwadraat verdeling from Kallenberg, 2005) and the critical area is $X^2 \geq 2.71$

7

H_0 is not rejected because $0.008 < 2.71$

8

Based on this data there is no reason to conclude that the chance of success in a tender process differ whether or not a project includes electrical installation.

Does the success score in tender procedures differ whether a project includes gas and water installations?

Below the SPSS output is shown for cross tables.

Gas-Water * Tender outcome Crosstabulation

Count

		Tender outcome		
		Lost	Won	Total
Gas-Water	Does not include gas-water installations	71	16	87
	Includes gas-water installations	73	9	82
Total		144	25	169

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4,143(b)	1	,042		
Continuity Correction(a)	3,357	1	,067		
Likelihood Ratio	4,244	1	,039		
Fisher's Exact Test				,045	,033
Linear-by-Linear Association	4,119	1	,042		
N of Valid Cases	178				

a Computed only for a 2x2 table

b 0 cells (,0%) have expected count less than 5. The minimum expected count is 14,01.

1

Model: "No gas-water installation" is seen as the first sample and "Gas-water installation" is the second sample. X is defined as the number of won tenders in group "No gas-water installation" and Y is the number won in group "Gas-water installation".

Suppose: X,Y are independent stochastic variables, $X \sim B(87,p_1)$ and $Y \sim B(82,p_2)$ with $0 \leq p_1,p_2 \leq 1$ being unknown parameters.

2

H_0: $p_1=p_2$

H_1: $p_1 \neq p_2$

3

Unit of test X^2

4

As H_0 is true X^2 is distributed chi-square approximately with one degree of freedom.

5

Value of unit of test $X^2 = 4.143$ (from SPSS output)

6

Critical value is 2.71 (Chi kwadraat verdeling from Kallenberg, 2005) and the critical area is $X^2 \geq 2.71$

7

H_0 is rejected because $4.143 > 2.71$

8

Based on this data it can be concluded that the chance of winning in a tender process differs between projects that do not include gas-water installations and ones that do.

Apparently projects that do not include gas-water installations are won more often.

Appendix III: (tender) procedures described in the PPL of Bosnia and Herzegovina

- Direct agreement: there is no tender procedure; a request for quotation is send to a single supplier. After possible negotiation the contract is signed between the customer and this supplier.
- Competitive quotation: three or more suppliers are contacted directly to send in a quotation.
- Open tender procedure: A notice is published and any supplier may respond to this by sending in a quotation. From these quotations the customer selects the supplier to which the contract will be awarded.
- Restricted procedure with prequalification: In the first stage of this process a notice is published and any supplier can submit a request for prequalification. In the second stage only selected suppliers from the first stage are asked to send in a quotation. From these quotations the customer selects the supplier to which the contract will be awarded.
- Negotiated procedure with publication of notice: In the first stage of this process a notice is published and any supplier can submit a request for prequalification. In the second stage only selected suppliers from the first stage are asked to send in a quotation. Negotiations take place and the suppliers submit a final quotation. These are evaluated and a winner is chosen.
- Negotiated procedure without publication of notice: more than one supplier is contacted and negotiations take place directly.
- Design contest.

Appendix IV: Documents required by customer

The following documents may have to accompany the quotation when it is send to the customer. This depends on what the customer has stated in the tender documentation.

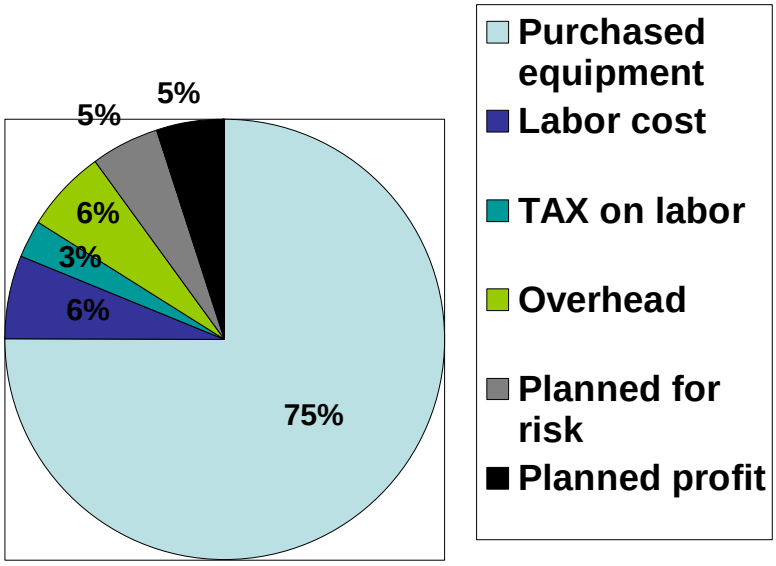
Document	Issued by
Registration of activities	Court
Statement that EGW d.o.o. and director are not convicted of criminal offence	Court (Judicial record)
Statement that EGW d.o.o. is not in liquidation	Court (Judicial record)
Statement that retirement fund for employees is paid	Retirement fund
List of all employees	Retirement fund
Statement that health insurance premium is paid for employees	Health insurance company
Statement that taxes are paid	Tax office
Company ID number	Tax office
Statement that EGW d.o.o. is in business involving energy	Institution for Energy by Bosnia and Herzegovina
Statement about what bank accounts are registered to EGW d.o.o.	Central bank (Centralna banka Bosne i Herzegovine)
Statement of what bank accounts are active	Banks
Bank guarantee statement	Bank
Balance sheet	EGW d.o.o.

(Mulamekić, 2007)

Appendix V: Cases studied

Name customer	Year
BH-Gas d.o.o. Sarajevo	2007
Općina Ilidža	2007
Ministarstvo Unutrašnjih Poslova	2007
Ministarstvo Unutrašnjih Poslova	2006
State Hospital	2006
Sarajevogas d.o.o. Sarajevo	2006
JPK Komunalać d.o.o. Hadžići	2006

Appendix VI: The cost structure of a typical installation project



Based on interview with Mr. Aganović.
The purpose of this graph only to give an indication about the distribution of costs in a typical installation project.

Appendix VII: Management summary (Dutch version)

Het management van EGW streeft naar het verbeteren van de kans op succes bij aanbestedingsprocedures voor installatie projecten. Daarom kreeg een student van de opleiding Technische Bedrijfskunde van de Universiteit Twente de opdracht om de resultaten uit het verleden en procedures te bestuderen en suggesties voor verbeteringen te doen.

Op basis van het onderzoek zijn de volgende aanbevelingen gedaan:

- De uitkomsten van de aanbestedingsprocedures moeten systematisch worden opgeslagen en geanalyseerd op problemen en marktontwikkelingen.
- Er moet een database voor standaard kosten worden gemaakt. Deze standaard kosten moeten worden gebruikt om offertes te maken en na afloop van een project moet er weer een vergelijking worden gemaakt met de werkelijke kosten.
- De kosten voor ingenieurs, opzichters en transport moet worden toegerekend aan het project waarvoor ze zijn gemaakt en moeten geen deel uitmaken van een algemene overhead factor.

Het doel van het onderzoek was om aanbevelingen te doen om de succes score bij aanbestedingen voor EGW te vergroten. Om te beginnen werden de resultaten uit het verleden onderzocht. Hieruit kwam dat er weinig significante verschillend waren wat betreft succes score tussen verschillende soorten projecten. Alleen projecten waarin mechanische installaties moeten worden aangelegd scoorden beter. Slechter scoorde het bedrijf op projecten waarbij installaties voor gas of water moesten worden aangelegd. Deze verschillen kunnen worden verklaard door het soort aandeelhouder dat het bedrijf in het verleden had en marktomstandigheden. Daarom is besloten dat de rest van het onderzoek alle soorten installatie projecten zou omvatten.

De procedures zijn erg belangrijk voor het binnenhalen van orders in deze bedrijfstak. Publieke en private opdrachtgevers gebruiken vaak dezelfde soort aanbestedingsprocedure, meestal de open tender procedure. Publieke opdrachtgevers moeten zich houden aan regels die zijn vastgelegd in de Public Procurement Law. Uit bestudering van de meest gebruikte procedures blijkt dat een procedure kan worden verloren voor een aannemer op drie verschillende manieren. De offerte kan niet in overeenstemming zijn met de regels, de offerte of de aannemer voldoen niet aan de kwalificatie criteria of de offerte wordt niet uitgekozen op basis van selectie criteria.
Op basis van deze onderverdeling werden de uitkomsten bestudeerd van offertes die naar opdrachtgevers zijn verstuurd. In alle gevallen werd de procedure verloren omdat de offerte niet werd gekozen op basis van de selectie criteria. De offertes voldeden dus wel aan de regels en EGW voldeed ook aan de kwalificatie criteria. Daarom hoeft de procedure om offertes op te stellen niet worden herzien.

Als vervolg werd er aandacht besteed aan de selectie criteria. Uit bestudering bleek dat prijs het belangrijkste criterium was voor opdrachtgevers en dat dit criterium zorgde voor veel verloren procedures voor EGW.
De prijzen in de bouw en installatie industrie zijn gebaseerd op kosten maar worden ook aangepast aan marktomstandigheden. EGW gebruikt een vergelijkbare methode.
Informatie en kostenvoordelen zijn erg belangrijk voor de succes score bij aanbestedingen. Om er voor te zorgen dat de offertes lager kunnen worden geprijsd, zonder het financiële risico te verhogen, moet de informatie over kosten accuraat zijn. Dit geldt voor de prijzen van arbeid, materialen, transport en opzichters. Daarom moet er database komen met standaard kosten en moeten de kosten correct worden toegewezen.

Ook moeten de omstandigheden op de markt in de gaten worden gehouden door te kijken naar trends in de aantallen projecten en succes score op verschillende soorten projecten.

Deze aanbevelingen zouden moeten zorgen voor betere kosten ramingen en toerekening van overhead kosten. Daarmee kunnen ook de prestaties beter worden gemeten en activiteiten worden opgespoord die verbetering behoeven. Dit heeft ook een positief effect op de motivatie van de medewerkers. Verbeterde prestaties leiden tot het verlagen van de kosten. Offertes kunnen lager worden geprijsd vanwege lagere kosten en betere schattingen en daarmee kan de succes score bij aanbestedingen worden verbeterd.