

Mat-2.177

Seminar on Case Studies in Operation Research

Status report

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Project: Bidding Optimisation in Electricity Exchanges

Client: Process Vision Ltd.

Project manager: Sami Niemelä, sniemela@cc.hut.fi

Project group: Antti Malava, antti.malava@hut.fi

Lauri Sommarberg, lauri.sommarberg@hut.fi

Kimmo Lehikoinen, kimmo.lehikoinen@hut.fi

Jaakko Lehtinen, jklehtin@cc.hut.fi

INTRODUCTION

This report is a deliverable in the project Bidding Optimisation in Electricity Exchanges, which is done for Process Vision Ltd. The project is also a part of the course Mat-2.177 at the Systems Analysis Laboratory in Helsinki University of Technology. The report is done for project follow-up, which means that more consideration is given to the project subjects than to detailed research results. The detailed description of theoretical results is given in the project end report.

First, the project status is clarified. Both theoretical and practical issues are covered. After that, the changes to the original project plan are discussed. The last main issue in this report is to give updated information about the project risks and risk management.

PROJECT STATUS

So far, the project group has been able to do all scheduled tasks in time. The first two phases (Planning and Background research) of the project have been closed successfully and the third one (Model definition) has progressed as planned. (Niemelä et al., 2005)

During the background research phase the project group was able to narrow down the research problem. It was found that there are two main types of approaching the bidding optimization problem; namely the game theoretic and classical approach (Baillio et al., 2004). Game theoretic approach requires much more information about the competitors in the market than the classical approach, which handles the whole market as a single entity. Because there is no guarantee that reliable information about the decision making environment of the competitors is available, the classical approach was chosen as the basic type for the suggested solution in this project.

Furthermore, in the classical approach the project group identified the key points of the bidding optimization procedure. The problem was divided into three different sub-problems: forecasting, optimization and handling stochasticity. There are both theoretical and practical issues that led to this division. Dividing the problem into sub-problems helps in the project management because different sub-problems can be assigned to different persons in the project group. The theoretical point was that similar solutions were found in literature (Shrestha et al., 2004). Based on this division, the project group is ready to propose a solution method for bidding optimization. In addition, the needs for the application that uses this method to calculate the optimal bidding data have been specified and some sketches about the MS Excel worksheet have already been done.

The idea is that forecasting is implemented in MS Excel with the standard functions. Optimization is done inside a module that uses the same model that Niemelä (2005) developed for Process Vision in his Master's Thesis. Stochastic considerations are made in MS Excel again

and they are based on scenario analysis. It is evident that there is a need for an interface between the optimization module and MS Excel. The suggested solution for this project is that the optimization module is encapsulated inside a COM-object, which offers a way to instantiate the procedure in MS Excel (through a Visual Basic macro). There is a COM-library in GENERIS, which allows time series data handling using the same technique, so the optimization parameters (results) can be set (read) from (to) the MS Excel worksheet.

The work tasks of different individuals have been specified on a weekly basis. The focus points of all project group members have been shifting during the project's progression. One idea was that this way all project group members maintain a clear overview of the whole situation. Another point is that some group members might have other projects or work to do during some week and therefore these people should be given a less time-consuming task for the corresponding week. The members who can put effort and time into the project are pushing the theoretical considerations forward, and the others are taking care of the mechanical tasks (e.g. documentation).

CHANGES TO PROJECT PLAN

There are no major changes to the project plan so far. The interpretation of some tasks might have changed a little during the project. The work amount estimates and work division estimates have proven to be quite accurate, although the focus of different individuals on different subjects has been clarified.

One major change in the forecasting sub-problem has been done. At first, an ARIMA-model was considered as the best option to produce market price forecasts. Because dynamic regression is much easier to implement in MS Excel and some group members have experience with this type of modeling, though, it was chosen as the implemented forecasting method for this project. The optimization method is planned so that other forecasting methods can easily be integrated in the same procedure.

RISK MANAGEMENT

In the project plan it was suggested that starting all tasks as soon as possible is a way to avoid the following risks: bad work amount estimates, insufficient know-how and failure to identify key tasks. This strategy has been successful so far in this project, although it must be emphasized that the implementation phase is still mainly ahead of us and the main risks concern that part of the project.

The project plan also suggested that lack of communication between different parties is a risk that affects the project result considerably. There have been no problems in communication inside the project group, and this risk has been avoided with the suggested strategies: weekly meetings and frequent communication. In the end of the third

project phase there is the task of model validation, which should guarantee that no misunderstandings have occurred in the communication between Process Vision and the project group.

No major risks have occurred yet in this project. The chosen risk management strategies have been sufficient so far, but there is still the risk that the challenges of the implementation phase have been underestimated. Thus, the project management must be careful in identifying any bias from the project plan.

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