

AUDIT-STAFF SCHEDULING: METHODS FOR THE SHORT-TERM LEVEL

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A survey conducted among 200 of the biggest German CPA firms indicates that the process of audit-staff scheduling is usually divided into three different levels, viz. medium-term, medium-to-short-term, and short-term planning [2]. This paper addresses the *short-term planning level* of the corresponding hierarchical approach. The short-term planning is based upon the results of the medium-to-short-term level for one week and one phase [1]. It assigns the auditors involved in auditing that phase in the considered week to the corresponding audit tasks and schedules them on the basis of periods of one hour. Decision objective is the balancing of the auditors' workload.

The problem is formulated in terms of a binary optimization model which is closely related to multi-mode resource-constrained project scheduling. Thereby, different auditors are tally with different modes while sets of auditors are equivalent to sets of modes. Apart from job completion, time, resource, and precedence constraints this model comprises also so-called set-of-mode-identity constraints which guarantee that the assignment of a set of auditors to a set of tasks, once done, is never changed.

As a consequence, for solving the short-term audit-staff scheduling problem, an appropriate two-stage algorithmic scheme has been developed which can be classified as parallel-randomized. The assignment of sets of auditors to sets of tasks and of single auditors out of one corresponding set to single tasks is performed in the first stage, while the actual scheduling of the tasks takes place in the second stage.

Several resource- and critical path-based rules are proposed and evaluated. For testing purposes a set of representative instances has been generated on the basis of empirically obtained data. We produced twelve types of test instances with different sizes and tractabilities. Afterwards, several solution variants have been tested on these types of instances. In addition, some small instances have been solved to optimality with the state-of-the-art MIP solvers OSL and LINDO, in order to provide evaluation benchmarks.

The results indicate that the heuristics are able to solve instances of realistic sizes in neglectible amounts of time and still yield "acceptable" solutions.

References

- [1] Salewski, F., L. Böttcher, A. Drexl (1993): Prüffeldorientierte Zuordnung von Prüfern für die operative Personaleinsatzplanung in Wirtschaftsprüfungsgesellschaften, Discussion Paper, Universität Kiel.
- [2] Salewski, F., A. Drexl (1993): Personaleinsatzplanung in Wirtschaftsprüfungsgesellschaften - Bestandsaufnahme und konzeptioneller Ansatz, to appear in: Zeitschrift für Betriebswirtschaft.