

Paper A: Guideline for peer grading

Instructions for peer grading (READ CAREFULLY!)

These bullet points are a guideline for the peer-grading correction. Maybe the given bullet points here are mentioned as an answer under a different question which would be fine as well. Therefore, we recommend to read the whole report before filling in the feedback categories. Furthermore, since there can be many things to be criticized about a scientific paper, other arguments can be correct as well. If you think your peer mentions a good and correct point, then treat it as equally important as the points mentioned in this guideline. Example: In Question 7. your peer mentions 3 points from the list and one other very good point, then they get the category "very good answer" because of 4 points mentioned.

Apart from the scientific content stated below, also the presentation of the report should be taken into account: Is the answer given in a clear, concise and understandable manner? If not, reflect it in your feedback by selecting one category lower.

Giving feedback is part of the individual assignment. If you are not participating in peer grading or are not taking this task seriously (e.g. giving random feedback without justification), we will deduct points from your individual assignment.

Guideline

1. **State the bibliographic information of the chosen paper (author, year, title, journal) .**

Alvarez, Pamela P.; Vera, Jorge (2011): *Application of Robust Optimization to the Sawmill Planning Problem*; Annals of Operations Research — 2011, pp. 1-19 <https://findit.dtu.dk/en/catalog/5441ff52acc4e2154d4060d2>

2. **In your own words, give a short summary of the planning problem that is addressed in this paper.**

- Tactical planning problem: main decision is how many logs should the saw mill to order from the forests to each location
- The sawmill purchases logs from forest locations which are transported to different sites and cut there in to boards. The logs are stored before they are cut with different patterns. After cutting, a part of the boards goes to directly to reprocessing and afterwards to storage while other boards are dried first.
- There are capacity restrictions on storage and process steps. It is possible to outsource the drying process step. The demand has to be covered in all realizations of uncertainty.
- The planning horizon is one year with monthly periods.
- The objective function is to maximize the profit

Rubric	Interpretation
No summary included	No points from above mentioned
Poor summary (missing major keypoints or misunderstood the planning problem or very poorly written)	1 of the above points is mentioned
Good summary (only missing minor keypoints or misunderstanding of minor aspects)	2-3 of the above points are mentioned
Excellent summary (nicely written, covers the keypoints, shows understanding of the paper)	4-5 of the above points are mentioned

3. In your own words, give a short summary of the methodology that is applied in this paper.

- (a) The authors apply robust optimization.
- (b) The uncertainty is modelled by introducing box uncertainty and a budget of uncertainty. The transformation still results in linear program that can be solved by a general purpose solver.
- (c) The model includes decisions on the purchasing and processing of logs and boards, the storage behavior and outsourcing. The capacity of all processing steps and storage is limited by respective upper bounds. The model also includes constraints to ensure the correct transformation from logs to boards using cutting patterns.

Rubric	Interpretation
No summary included	No points from above mentioned
Poor summary (missing major keypoints or misunderstood the planning problem or very poorly written)	Point (a) is mentioned
Good summary (only missing minor keypoints or misunderstanding of minor aspects)	Points (a)+(b) are mentioned
Excellent summary (nicely written, covers the keypoints, shows understanding of the paper)	Points (a),(b) and (c) are mentioned

4. Briefly answer: Do you think the chosen optimization methodology (robust optimization or stochastic programming) is appropriate for the planning problem? Why or why not?

- (a) The methodology is appropriate.
- (b) It is appropriate here since it was chosen to extend an existing linear program. Furthermore, no probabilistic information was available to be used for stochastic programming.
- (c) For a planning problem like here, this approach can be rather conservative, since no reaction to uncertainty is possible. Here an extension to adjustable robust optimization or a switch to stochastic programming would be advisable.

Rubric	Interpretation
No answer given	No points from above mentioned
Poor answer (Minor parts correct, but major part incorrect or missing)	only point (a) mentioned
Good answer (minor mistakes or minor aspects missing)	(a) and (b) (or similar argumentation)
Very good answer (correct and complete)	(a), (b) or similar, and (c) or similar (criticism about correctness, suggestions for improvement)

5. What are the uncertain components of the planning problem and how is the uncertainty modelled?

- The uncertain parameter in the model is the yield of the sawing step, i.e., it is uncertain how many boards of each type we will result in after processing a log.
- The uncertainty is modelled by using a budget of uncertainty, i.e., the the number of coefficients is limited to Γ_i .
- The deviation from the yield is modelled as box uncertainty set.
- The deviations are defined as given percentage deviations from the mean.

Rubric	Interpretation
No answer given	No points from above mentioned
Poor answer (Minor parts correct, but major part incorrect or missing)	only 1 point from above mentioned
Good answer (minor mistakes or minor aspects missing)	2 points from above mentioned
Very good answer (correct and complete)	3-4 points from above mentioned

6. In this task focus on the input data handling for the uncertainty, i.e., scenarios or uncertainty sets. Do you think the description and modelling of the uncertainty is appropriate (e.g. Is enough information given on how the uncertainty representation is determined based on data for the particular case? Was the right approach for uncertainty modelling chosen in your opinion? Was the quality ensured by some analysis?, ...).

- It is assumed that the yield varies in a certain interval (box uncertainty) and not all of them vary at the same time (budget uncertainty), which sounds reasonable.
- The parameters of the box uncertainty set and budget of uncertainty are varied in the numerical analysis to evaluate the impact of the modeling of the uncertainty, which is an important analysis.
- It would have been good to get an overview of historic variations on the yield to be able to judge if the assumptions made are valid.
- There is no information about how the mean and deviations are determined.
- Other uncertain parameters are mentioned but ignored.

Rubric	Interpretation
No answer given	No points from above mentioned
Poor answer (Minor parts correct, but major part incorrect or missing)	only 1 point from above mentioned
Good answer (minor mistakes or minor aspects missing)	2 points from above mentioned
Very good answer (correct and complete)	3-4 points from above mentioned

7. Briefly judge the quality of the numerical experiments and analysis of the solution (e.g. Is the analysis extensive enough? Are there aspects missing? Do you have suggestions for improvement?, ...)

- The authors vary the input parameters of the uncertainty to evaluate the different solutions, which is a good sensitivity analysis.
- Furthermore, the solutions are tested in an out-of-sample test where the authors check how many times the production plan would have resulted in infeasibility. They use different sampling techniques, which is very important.
- The authors also compare the structure of the solution of the deterministic and robust solution. This is an important analysis for the management.
- In order to evaluate the impact and quality of the experiments, the authors should have provided more details on the input data. For example, demand data, typical cutting patterns, cost factors. Without these values, the numbers are hard to judge.
- Furthermore, an analysis of purchasing and production over time incl. storage behavior would be needed for a full picture.
- No runtime for the model given.

Rubric	Interpretation
No answer given	No points from above mentioned
Poor answer (Minor parts correct, but major part incorrect or missing)	only 1 point from above mentioned
Good answer (minor mistakes or minor aspects missing)	2-3 points from above mentioned (or similar)
Very good answer (correct and complete)	4-5 points from above mentioned (or similar)