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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Review Article: Multi-criteria decision making for flood risk management: a survey of the current state-of-the-art" *by* M. M. de Brito and M. Evers

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Dear Referee, thank you for your helpful comments and feedback. The manuscript will be revised according to the provided suggestions, which will help to improve the paper before final submission. Please find our response to each one of your comments and questions raised bellow.

Specific comments

1) Chapter 1 Introduction "I suggest an authors' revision of the introduc-

tion part, integrating the definition of MCDM presented in chapter 2."

Thank you for this suggestion. We fully agree and we will include the following definition of MCDM: MCDM is an umbrella term used to describe a set of methods for structuring and evaluating alternatives on the basis of multiple criteria and objectives (Voogd, 1983).

2) Chapter 2 Overview of multi-criteria decision making methods "It is not clear the meaning of chapter two. The authors state "Table 1 provides an outline of the fundamental properties of the MCDM methods analysed throughout the paper". Is it a general classification, a research method/classification or is part of the findings?"

Chapter 2 aims to give readers a basic overview of the MCDM methods that were cited in the review. Table 1 does not provide a classification and is not part of the findings. It just summarizes the most common MCDM tools, which were mentioned in the review.

Following the suggestion of Referee #1, we will add a more detailed description of the MCDM methods and their classification scheme. In general, existing MCDM techniques can be categorized into the following groups (Hajkowicz and Collins 2007):

1. outranking approaches (ELECTRE and PROMETHEE);
2. multi-criteria value function (MAUT and MAVT);
3. distance to ideal point methods (CP and TOPSIS);
4. pairwise comparisons (AHP and ANP);
5. other methods (VIKOR, DEMATEL and fuzzy approaches).

This classification as well as a more clearly description of Table 1 will be included in Chapter 2.

3) Chapter 3 Framework for systematic literature review "is useful to understand the way papers have been selected and excluded, but I think it can be shortened a bit"

We agree that the Chapter 3 is a little long. Therefore, it will be shortened.

4) Chapter 5.1 Summary "The summary provided in chapter 5.1 is very well written, but it's a summary. A lot of information in this chapter should integrate the abstract part that seems to be focused only in the methodological part (classification of applications area) and less on the real findings of this review.

Thank you for your help, we completely agree with your suggestion. We will exclude the classification of application areas provided in the abstract and add some more words regarding the conclusions and final outcomes. However, since the abstract is limited to 200 words, it will not be possible to add a detailed description of the findings.

We will revise the conclusion section based on your comments.

5) Chapter 5.2 Recommendations for future research "include a critical discussion of the findings of the review. Discussion can be explored in a chapter before conclusion and recommendations can be integrated at the end of the conclusions chapter itself."

We will add a new Chapter named *"5. Research limitations and recommendations for future research"*, in which we will address the main gaps found in the literature, the limitations of this research and suggestions for future improvements. A paragraph summarizing the recommendations for further research will be added to the conclusion chapter.

6) Chapter 5.3 Limitations "include limitations, methodological limitations, discussions and conclusions - about the scientific outcomes of the present review. I suggest deleting this paragraph, that is very long and it could give the idea that this work have no scientific meaning. However, authors have to take the information included in it and divide them in the chapter of relevance. Limitations can be the reason of a call for more research or for amelioration the present study".

We did not entirely understand this suggestion. Does the Referee mean to exclude the entire section 5.3 or just the last paragraph with the scientific outputs? We agree with the Referee that the limitations can be divided into the chapter of relevance. However, it is a common practice in review papers to add a limitation chapter. Examples of review papers that use this structure include: Beecham et al. (2008), Broekhuizen et al. (2015), Govindan and Jepsen (2015), Huang et al. (2011) and many others. In the same sense, Pickering and Byrne (2014) emphasize that systematic literature reviews should always acknowledge limitations due to bias in publication selection and classification.

Therefore, considering that limitations can be the reason of a call for more research, we will incorporate the section 5.3 in the new chapter, named *"5. Research limitations and recommendations for future research"*.

7) "Figure 1: Please use the point instead of the comma when expressing the numbers in the equation and the coefficient of determination. The subscript 2 in R coefficient is missing. Moreover I suggest considering only two decimals because in this type of regression further details are not needed."

Thanks for pointing it out. However, following the suggestion of Referee #1, the polynomial model and R^2 will be excluded from Figure 1.

9) "Figure 2: There are two colours that are pretty similar: Risk assessment and susceptibility assessment. Please change them. Moreover I suggest putting the title of y-axis."

We fully agree and the figure has been revised accordingly to improve presentation quality/clarity, as shown in Figure 1.

10) "Figure 3: There are two colours that are pretty similar: Group meeting and Focus Group Discussion. Please change them. Remember that the colours of the printed version could be in black and white and make the reading difficult. If it is possible, I suggest changing the pie chart with a lot of colours with a horizontal bar chart with one colour. This remains to the author's discretion."

Thanks for your comment. We agree with your suggestion and changed this figure to a horizontal chart, as shown in Figure 2.

11) "Regarding the supplementary material I guess that it is a very good summary of the paper reviewed, however I suggest to do not put questions as column fields and simplify them with lower words. Moreover, some of the fields are empty. Just put a footnote and motivate them, because sometimes is written that information are "not mentioned" and sometimes the field is empty"

Thanks. This is a very good point. We will change it accordingly.

We wrote "not mentioned" when multiple stakeholders were considered in the analysis, but the authors did not mention the technique applied to capture the stakeholders' opinion (e.g. questionnaires, interviews). In the case where multiple stakeholders were not considered, the column "which participatory technique was applied" is empty.

Footnotes will be added to better explain this difference.

Minor changes

12) "Page 6698, line 24. "China accounts for 19.40 % of all applications, what is not too surprising" Please comment why this should be not so surprising."

As explained in Page 6698, line 24, this is not surprising because "similar results were obtained by other MCDM review papers (e.g. Jato-Espino et al., 2014)".

13) Page 6702, line 6. What "careful facilitation" is?

Facilitation is a process in which a neutral person helps a group to work together more effectively. When decisions are made in group, the moderators need to carefully assist the participants and coordinate the workshop or meeting. The moderators, which are often called facilitators, create a supportive environment in which learning can take place. They support the learning process of the participants by facilitating this exchange of ideas and experience (Sims, 2006).

We will modify the text so that it is clear to the reader what facilitation means.

14) Other minor suggestions

We fully agree with all minor suggestions and all of them will be modified accordingly.

References

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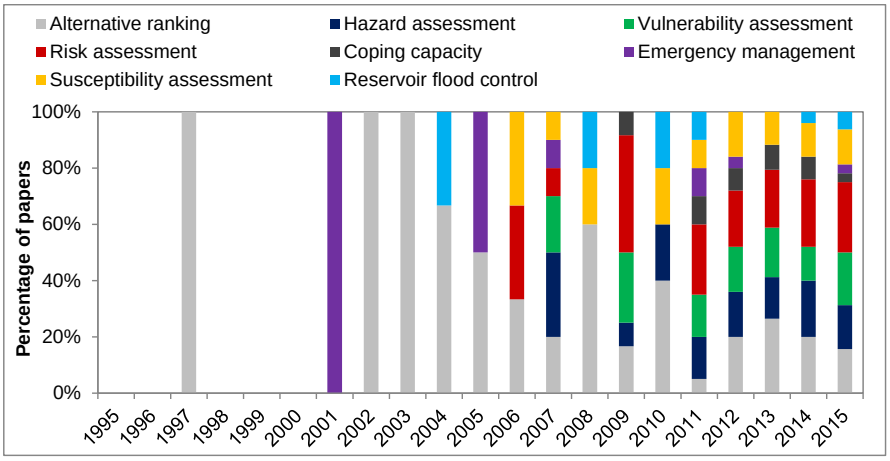

Fig. 1. Distribution of MCDM papers by application area between 1995 and June 2015.

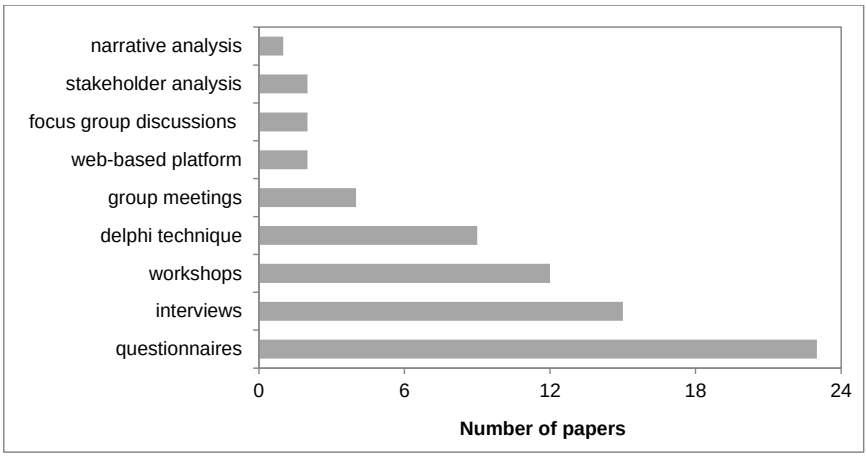

Fig. 2. Methods used to incorporate multiple stakeholders' views in the decision-making process.