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Reply on RC2

John Conallin et al.

Author comment on "A review of the applicability of the motivations and abilities (MOTA) framework for assessing the implementation success of water resources management plans and policies" by John Conallin et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-545-AC2>, 2021

Referee 2 General comments

- The article beautifully synthesizes the science behind the MOTA framework and its application. The authors also critically review the MOTA framework by bringing more insights and opportunities for further development which would widen the applicability of the framework. The authors also propose three "add-in(s)" for MOTA which would broaden its applicability which is a valuable contribution to the theory as well as to its applicability and flexibility. However, I do have some comments.

Authors' response and changes

We thank the reviewer for their compliments and constructive comments. We have addressed these comments and believe that the manuscript is now much improved.

- Sections 3 to on-ward found to be mostly based on the literature up to 2019. The recently published literature might have more insights that are potentially missed in this article.

Authors' response and changes

While drafting the paper, we had recently found the Sadik et al. (2020) and (2021) references and added them to the Appendix table, but had forgotten to review them in the main text. We apologise for this oversight.

We have now incorporated reviews of these recent references into the main text by making the following changes:

A. The second paragraph under '3 The applicability of MOTA in differing contexts' now reads:

'Despite the relative newness of the framework (it was first published by Phi et al. (2015)), at the time of writing it has already been applied to 13 studies in two countries (Vietnam and Bangladesh) (Table S1, Supplement). The triggers for MOTA analysis have

included climate change impacts (mainly increased flood risk and salinity intrusion) (Nguyen et al., 2019b; Nguyen et al., 2020), the need to modernise the agricultural sector (Korbee et al., 2019b; Korbee et al., 2019a), diminishing groundwater supplies (Pieffers, 2019), and the announcement of participatory water management plans (Sadik et al., 2020; Sadik et al., 2021).'

B. The first paragraph under '3.2 Societal adoptability MOTA (A-MOTA)', now reads:

'Most MOTA applications to date have been for assessing societal adoption (Table S1, Supplement). The actors of interest in these bottom-up investigations have included farmers, local government staff, NGO's and other societal actors such as social-based organisations.'

C. The first paragraph under '3.2.2 Local government/other societal actors', now reads:

The application contexts of MOTA to local government stakeholders and other societal actors have been a little more varied than those pertaining exclusively to farmers (Arora, 2018; Korbee et al., 2018; Nguyen et al., 2019a; Sadik et al., 2020; Sadik et al., 2021). Nguyen et al. (2019a), for instance, used MOTA to investigate the bottom-up implementation of retrofitting responses to urban flood risk in Ho Chi Minh City (Vietnam), by focusing on District-level Municipality Offices, City-level Sectorial Departments, and Social Mass Organisations (Vietnam Fatherland Front Committee, Vietnam Women's Union, and Ho Chi Minh City Communist Youth Union). The MOTA analysis revealed that the most feasible measure implementable in the short term was a conventional drainage system, as the stakeholders had an average motivation and high ability to implement this type of system (Nguyen et al., 2019a). By contrast, Sadik et al. (2020) used MOTA to assess the implementation feasibility of participatory water management (PWM) reforms in Bangladesh, and found that the framework was capable of informing policymakers and implementing agencies about how to enhance the stakeholders' motivation and ability to ensure effective implementation of PWM reforms. Furthermore, Arora (2018) applied a bottom-up MOTA approach to understand the position of the People's Committee (provincial government) stakeholders with regard to the implementation of Mekong Delta Plan in Ben Tre province (Vietnam), and found the approach to be effective in confirming that officials were positive about the direction of implementation and had no major concerns with adaptation.

D. The first sentence under '3.3 Broader uses of the MOTA framework reported in the literature' now reads:

'All of the MOTA studies reviewed argue that the overarching benefit derived from undertaking MOTA analysis is an increased likelihood of achieving plan implementation success (e.g. Phi et al., 2015; Hoan et al., 2019; Korbee et al., 2019a; Nguyen et al., 2019b; Nguyen et al., 2019a; Sadik et al., 2020; Sadik et al., 2021).'

E. At the end of the paragraph under '4.2 Visually conceptualising the MOTA elements prior to designing the surveys (Step 2)', we have added:

'Sadik et al. (2020) also used causal relationship and indicator mapping to explore the interlinkages among the indicators and relationships among the MOTA elements. This exercise helped them to visualize and understand the MOTA elements, refine the MOTA indicators and improve the survey methodology (Sadik et al., 2020).'

F. We have also added the Sadik et al. (2020) reference into references section and the Table S1, Supplement.

- The proposed add-in(s) for stage 5 seems to be part of the MOTA components rather than to be standalone components as illustrated in Figure 5, for example:
 - The "characteristics of the actor" add-in is indeed interesting. But how it will be quantified is not clear. Rather than placing it as a standalone component of Motivation, it can be linked with the ability components. For example, the innovativeness characteristics can be included in the technical ability; the environmental belief can be included in the social ability.
 - The "Characteristics of innovation" is interesting. Isn't it already in the Perceived opportunity/threat? For example, if the trigger is an innovation of technology and the action is adoption or rejection of the technology, the MOTA component "perceived O&T" includes advantages of using the technology which might be compatibility, complexity, trialability etc.
 - another proposed add-in is "social norms" which is a part of the institutional ability.

Authors' response and changes

- - As noted below (see response to PDF comment 9), we have amended the Discussion to more clearly acknowledge the potential linkages between abilities (i.e. technical and social) with the characteristics of an innovation and the characteristics of the actor. Figure 5 has also been updated to ensure that these linkages are identified.
 - The characteristics of an innovation is a standalone construct that was adapted from Diffusion of Innovation (DOI). This construct is likely to be a significant factor which will influence an actor's assessment of the perceived O&T associated with an intervention (see response to PDF comment 9 for further details).
 - We have amended the conceptual model (i.e. Fig. 5) to illustrate the relationship between social norms and institutional abilities. As above, the notion of social norms is distinct from institutional abilities and was adapted through the application of Theory of Planned Behaviour (TPB), DOI and other sociological theories.

- More explanation on Figure 5 would help the reader. Especially how these add-on(s) can be operationalized and applied could be discussed.

Authors' response and changes

We have provided further suggestions for how various sources of data (i.e. survey, in-depth interviews, archival) can be utilised as part of the measurement of the characteristics of actors and innovations. As part of this processes, researchers can make use of established survey scales and theoretical constructs.

- It seems the proposed add-in(s) as illustrated in the Figure 5 are specific to adoption of innovative technology but such explanations are not provided. It is therefore needed to clarify whether these add-in(s) are generalized or specific to the research problem/context of the author.

Authors' response and changes

We have further outlined how, consistent with Rogers (2010), plan implementation can be conceptualised as a form of innovation given the introduction of new ideas.

- Further clarification on whether these add-in(s) are for I-MOTA or for A-MOTA would be helpful. Because due the change of actors (from adopting actor to implementing actor) the notion of those add-ins might need to be changed. For example, the Characteristics of Innovations as described in Figure 5 are more relevant to an Implementing Actor (an organization or Agency) rather than an Adopting Actor (Society).

Authors' response and changes

Throughout the paper, we adopt a broad definition of actor to include both individuals (i.e. in the context of A-MOTA) or government/corporate departments/organisations (i.e. in the context of I-MOTA). In line with the reviewer's suggestions, however, throughout section 4.4 (i.e. step 5) we have provided further materials which help to illustrate how the measurement of the constructs might differ between I-MOTA and A-MOTA.

PDF comments

- Why behavioural theory is important here needs to be addressed first

Authors' response and changes

Yes, this point is relevant. We have added the text: "The inclusion of behavioural theory is an important consideration due to the active nature of implementation, where stakeholders are required to enact a change"

- It seems that the later sections are mostly based on the literature published up to 2020. Although there is a supplementary table listing some reviewed literature in 2021. But those reviews are not found in the relevant sections.

Authors' response and changes

Now addressed. Please see our response and changes made for General comment 2 by Referee 2.

- The Kulsum et al 2020 tried to use MOTA to predict the future behaviour of farmers towards a change and tried to interlink MOTA with adaptation pathway, which is an interesting application of MOTA which can be reviewed here. Because, such application of MOTA is a non-traditional use of MOTA.

Authors' response and changes

Thank you for the suggestion. We have further incorporated this into the review section of Appendix A, which contains Kulsum 2020.

- Although the MOTA framework does not directly offer any tool for ability improvement, the MOTA indeed offers a systematic approach of assessing the ability towards an action and thus reveals the scopes (opportunities) of ability improvement. Sadik et al 2021 argued that the MOTA framework can be interlinked with other framework for designing ability enhancement/building plans. They showed that extending the MOTA

elements up to indicator level helped detailing out the ability. And its livelihood group-wise application could help them further to explore the scopes of designing ability enhancement plan specific to an actor.

Authors' response and changes

The Sadik et al (2021) paper is relevant here, as the indicators allow for greater nuance between ability components to be sought. We have included the following text: 'Sadik et al., (2021) developed a set of indicators for each component of ability, including social ability, thereby further disentangling these elements and allowing for specific areas of ability to be targeted.'

- Kulsum et al 2020 showed another use of MOTA. in her research she used MOTA to predict adaptation of action of the farmers in response to the salinity change and uncertainty.

Authors' response and changes

Noted, and this is captured in the text in a more clear and concise way now. In text now - 'Kulsum (2020) used MOTA to predict adaptation pathways of the farmers in response to the salinity change and uncertainty in Bangladesh.'

- The another use of MOTA is "Stakeholder Mapping". Besides the original MOTA framework, the MOTA manual (Quan et. al 2019) presents a tool name MOTA Mapping for stakeholder analysis and mapping.

Authors' response and changes

Yes, and this is a good point as we have discussed in Step 2 creating an initial conceptual MOTA map to aid in a visual representation of where stakeholders are situated in relation to motivations and abilities, and their potential to support or resist a project.

Text has been added to manuscript - 'MOTA mapping, where stakeholders are categorised according to their motivations and abilities, is usually not conducted until Step 5. However, it could be included as part of the initial stakeholder analysis to provide a visual representation of where the problem holder thinks stakeholders sit in relation to motivations and abilities, and their support or resistance to the project. The MOTA map could then be updated as more empirical evidence is collected through step's 2-5.'

- This is indeed an important and effective add in. Sadik et al 2020 used a casual-loop/causal relationship and indicator mapping to explore the interlinkages among the indicators and relationship among the MOTA components. Following the Indicator map, the authors further developed a graphical framework to illustrate the relationship among the MOTA components and element. Such exercise helped to visualize and understand the MOTA elements, fine tune the MOTA indicators and improve the overall survey methodology.

Authors' response and changes

Thanks for this information. This has now been incorporated into section 4.2. Please see

our changes made in response to General comment 2 by Referee 2.

- There is a limitation of statistical application with ordinal number scale. From that perspective, it is better to use cardinal scale/number which would allow further statistical analysis.

Authors' response and changes

Yes, we agree, hence the reason why we have advocated for using extended Likert scales instead of ordinal number scales .

- The "characteristics of the actor" add-in is indeed interesting. But how it will be quantified is not clear. Rather than placing it as a standalone component of Motivation, it can be linked with the ability components. For example, the innovativeness characteristics can be included in the technical ability; the environmental belief can be included in the social ability.

Authors' response and changes

This observation makes a good point as there is seemingly some cross-over between the 'add-in' components and the existing constructs within the MOTA framework, such as technical ability which you refer to. However, we think the strength lies in linking the MOTA framework with established theoretical elements rather than trying to fit different behavioural constructs into the existing MOTA. By having these 'add-ins', the process of analysis is more likely to incorporate the vast body of work supporting TPB and DoI (and established mechanisms for measurement of constructs), whereas it might be easier but less effective to incorporate 'bits' of these theories into existing MOTA elements.

We have added the following text: 'Whilst the abovementioned constructs relating to characteristics of an innovation and the characteristics of the actor may seemingly link to different components of MOTA (i.e. actor innovativeness and technical ability, actor environmental beliefs and social ability), we see these characteristics as standalone elements. With connections to established theories (such as TBP or DoI) the additional components allow for more robust and holistic analysis of the implementation action through the body of work underpinning them. This acknowledgement of where the add-ins come from is important to the overall adapted MOTA framework and preferred over selecting elements of those theories that seem to fit with the existing MOTA framework. Depending on the context and the underlying nature of the actor (i.e. A-MOTA or I-MOTA), as part of the quantification of the characteristics of innovations and of actors, researchers can make use of established theoretical constructs and survey scales. The concepts can be further explored through in-depth, qualitative interviews. Archival data (i.e. financial statements, budgets, strategic documents) may also be particularly relevant for I-MOTA analysis given the insights they may reveal about an organisation's size, performance, willingness to invest in innovation, and environmental credentials.'