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Evaluation of the content validity of the intrinsic-instrumental assessment tool for assessing the nature values of constructed wetlands

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Abstract

Constructed wetlands possess tremendous nature values, namely instrumental and intrinsic values. Constructed wetlands also store and capture carbon which help to mitigate climate change in sustaining our earth system. Hence, sound management of constructed wetlands must consider its importance as essential assets that increase their resilience in mitigation and adaptation strategies towards adverse effects of climate change. To examine the vital value of constructed wetlands, this study attempts to evaluate the content validity of the developed Intrinsic-Instrument Assessment (IIA) tool for assessing the nature values of constructed wetlands in the context of climate change. A methodological study was conducted to evaluate the content validity of the IIA tool in two-phases. First, a comprehensive literature review was conducted at the development phase to identify the construct and dimension, generate items and instrument formation. In the second phase (evaluation), a committee of six experts performed the content validity evaluation, and the content validity index was implemented for content validity quantification. Finally, the researcher conducted a discussion between the team members to finalise the items of the IIA tool. The first version of the IIA tool identified three domains (instrumental, objective and intrinsic values) with 36 items. The item content validity index (I-CVI) ranges from 0.833 to 1. The overall content validity index using the average approach, the scale content validity index (S-CVI/Ave) is 0.97. Thus, the IIA tool was evaluated with highly relevant and excellent content validity. Researchers generated 17 additional items in the IIA version 2.0 after considering experts' feedback. Still, after the second evaluation by researchers, the final version of the IIA tool consists of 42 items. This paper contributes to the body of knowledge by performing the systematic process of the essential steps to verify the developed instrument's reliability and validity, especially in the field of socio-ecology. This study provides comprehensive information and example as guidance for evaluating content validity for a new instrument scale. Also, it helps to bring insight into constructed wetlands' vital nature values as the nature solution in mitigating and adapting climate change to advocate the sustainable development of constructed wetlands ecosystems.

Keywords: Climate change, constructed wetlands, content validity, instrumental value, intrinsic value, nature values

Introduction

Wetlands and its nature values

Wetlands are of the most diverse and critical ecosystems on the earth. According to the Millennium Ecosystem Assessment (MEA) (MEA 2005), wetlands are complex ecosystems that include lakes, marshes and floodplains often covered in water-saturated soil and provide various services that contribute to human wellbeing and the environment. Besides, MEA classifies wetland ecosystem services into four: regulating, provisioning, supporting and cultural services and all these services are mutually dependent. The growing awareness of the broad range of ecological, social and economic advantages that natural wetland habitats offered to humans has sparked interest in the emerging of constructed wetlands that mimic natural wetlands' functions and services (Masi et al., 2018). Nonetheless, many of us are still puzzled about differentiating between functions and values provided by constructed wetlands and considered both meanings identical (Hosnan, 2012) which may lead to a lack of sound constructed wetlands management and negatively impact the ecosystem.

Constructed wetlands possess tremendous nature values, namely instrumental and intrinsic values in supporting climate change mitigation and adaptation. Instrumental values are generally apparent in nature valuation in which the items or things are intended to some outer end (Pascual et al., 2017) and are consistently contingent (Sandler, 2012). This idea holds to the human-centric nature, addressing an intimate among science and economic views whereby the positive reason has been approved to justify why this constructed wetland ecosystem is fundamentally essential and ought to be secured. Subsequently, it is an extreme threat when a part of ecosystem functions and values are chosen for further assessment and evaluation. In contrast, intrinsic values mean an item's worth all by itself. Regular substances, including biotic species of the environment, have characteristics worth benefiting their freedom from individual control. In environment benefits, the establishment of intrinsic value is seen from two perspectives which are objective and subjective intrinsic values (Sandler, 2012). Objective intrinsic value can be described as all living beings have natural worth – the benefit of their own, related to its elements or properties in which it is important and found as opposed to producing by people. While subjective intrinsic value is esteemed for what it is, not intended for what the ecosystem can do. Individuals generally evaluate this subjective intrinsic value for different reasons, for instance, specific mementoes, prehistoric sites, biodiversity or cultural and spiritual significance because of their exemplifies, extraordinariness or magnificence. Consequently, the subjective intrinsic value can be recognised from someone's feelings and interests (Gómez-Baggethun et al., 2014).

Therefore, in this study, the instrumental value of constructed wetlands refers to the ecosystem's functions and services to help in the mitigation and adaptation to climate change. Constructed wetlands are typically designed to simulate wetland processes, such as water storage, flood retention and water quality improvement (Rossa et al., 2019; Sidek et al., 2018). Moreover, constructed wetlands can be used to reduce emissions from both diffuse and point sources. In addition, constructed wetlands effectively treat water for various uses, including treatment for agricultural and domestic services (Ahmad et al., 2016; Akhir et al., 2016). Despite their importance in improving water quality, constructed wetlands have been shown in many studies to be excellent in sequestering carbon dioxide in the atmosphere (de Klein & van der Werf, 2014; Reddy et al., 2016; Stumpner et al., 2018). In addition, constructed wetlands show the highest carbon storage and are the largest carbon pool, contributing significantly to global carbon cycling (Mitsch et al., 2014; Villa & Bernal, 2018). However, most constructed wetland research focused on the purification feature, with less attention given to sequestering carbon dioxide and rehabilitating water for water security and other values (Rosli et al., 2017).

Recent research shows that harnessing constructed wetlands is a possible mitigation strategy in addressing the carbon-water nexus which refers to nature and engineered physicochemical processes at the atmosphere's interface between carbon and water cycles (Clarens & Peters, 2016; Were et al., 2019). The nature processes derive the constructed wetlands' objective intrinsic value, like controlling the climate's temperature, delivering oxygen and managing the quality and quantity of water reserves. Simultaneously, the high potential in sequestering carbon and rehabilitating water at the constructed wetlands evolve from interactions between their elements, such as soil, plants, water, organisms, microbes and the processes (carbon, water and nutrient cycles) in the ecology environment. These ecosystem services aid the maintenance of nature ecology and ecosystem functions and are vital not only for humans but also for environment life-sustaining. Meanwhile, the subjective intrinsic of constructed wetlands is denoted by their biodiversity, heritage and recreation values. Hence, constructed wetlands are seen to have great potential as nature innovative tool to combat climate change and its impact on water resources in line with the Sustainable Development Goals (SDGs) by the United Nations (UN) through SDG 6 and SDG 13 (https://sdgs.un.org).

Thus, the questions raised, what is the importance of nature values for constructed wetlands in adapting climate change mitigation? and how does the constructed wetland bring well-being to its environment and humans? are concerns of this study. Understanding constructed wetlands have complex interaction between their surroundings and people (Arias-Arévalo et al., 2017; Justus et al., 2009; Ku & Zaroff, 2014) in which the previous studies focused on the physical valuation, which is mainly related to regulating and provisioning services provided by this ecosystem (Bernal & Mitsch, 2014; Erik Gómez-Baggethun & Barton, 2013; Mitsch et al., 2015; Papias et al., 2018). However, studies on the 'soft value' possessed by the constructed wetlands seems to be neglected in the literature (Rooney et al., 2015; Sherren & Verstraten, 2013).

To some extent, constructed wetlands favour people differently since different people value this ecosystem differently (Pascual et al., 2017). Therefore, it is necessary to grasp the stakeholders' values and views regarding constructed wetlands' services and benefits. The significance of the constructed wetlands' ecosystem will aid in prioritising conservation efforts by the management for decision-making purposes. Hence, it is of great concern to use a valid assessment tool to identify the importance of constructed wetland's nature value. It is imperative to use measurement instruments with scales linked to the agreed-upon construct of nature values (Arias-Arévalo et al., 2018) to ensure the right strategies for constructed wetland conservation and preservation in climate change mitigation and adaptation.

Instrument validation

Research measuring constructs are formulated at a high level of abstraction for which valid and reliable instruments are needed (Shrotryia & Dhanda, 2019). Thus, an assessment tool, "Intrinsic-Instrumental Assessment (IIA)" was developed in this study must be validated. The idea of developing a tool was adapted from the *Natural Area Value Scale* by Winter and Lockwood (2004; 2005). The validity test ensures the evaluation tool is suitable for assessing what it plans to measure (Masuwai et al., 2016). It is also vital to ascertain the developed tool reflecting the theory or concept applied in the study. Moreover, Rubio et al., (2003) stated that the instrument or tool should be clear, brief, straightforward and easy to administer. Lengthy statements that are difficult to interpret by the respondent may result in a lower response rate or incorrect response. Validity lies in how an instrument is utilised and scrutinised, including content, construct and criterion validity (Zamanzadeh et al., 2015). As content validity is a requirement for other types of validity, it should be first verified in developing the tool. I t is critical to proving an evaluation tool's content validity like a questionnaire, particularly for research purposes.

The motivation behind content validation is to reduce errors related to the tool operation at the early stage and increase the possibility of acquiring construct validity at the later stage. Content validity can be described as the ability of the selected items to indicate the constructs' variables. This type of validity addresses the level to which tool items suitably represent the specific content domain (McCormick et al., 2015; Rubio et al., 2003). Furthermore, content validity provides valuable information on the relevance, clarity and comprehension of items and help to improve the tool through constructive comments and suggestions from a panel expert (Polit & Beck, 2006) rather than by peers (Tang, 2018). In addition, content validity measurement is conducted to improve the instruments' reliability and clarity (Field et al., 2012; Zamanzadeh et al., 2015). Thus, content validity is acquired in each study for which an instrument is utilised. Hence, this study aims to evaluate the content validity of the developed Intrinsic-Instrument Assessment (IIA) tool for the nature values of constructed wetlands. The purpose is to ensure that the assessment tool comprehensively measures the relevant aspects to evaluate the nature values of constructed wetlands in the context of climate change, as discussed above·

Methodology

The process of content validity IIA consists of two phases, namely, instrument development and evaluation. The two-phase process ensures verification and quantification content validity throughout the process of instrumentation. The first phase results in the generation of the instrument items, while in the second phase, the generated instrument items' reliability was validated with the cooperation of six panel experts. Figure 1 shows the flow chart of the development and validation of the IIA tool. The quantification of the content validity of IIA was interpreted using the content validity index (CVI).

Phase 1: Instrument development

The development of the IIA includes two steps of comprehensive literature reviews guided by ROSES (Haddaway et al., 2018). The following research questions were used as a guide in searching the literature review:

1) Which concept or theory is best for evaluating the ecosystem services and values of constructed wetlands?
2) Which constructs and items are essential and representing the instrument's dimensions in the context of climate change mitigation and adaptation?

Therefore, in the first step of the literature review, the objective was to identify the theoretical framework and develop the conceptual framework for the carbon-water nexus of constructed wetlands. The conceptual framework named as carbon-water nexus was developed by integrating the MEA's concept and nature values theory provided by the constructed wetlands. Besides that, suitable constructs, dimensions and items were also identified and generated at this phase. Then, the second step of the literature review intended to identify the gaps and opportunities of constructed wetlands. Furthermore, this step was done to confirm the conceptual framework and specify constructs and items for assessment gathered in the first review session. Thus, both evaluations followed an iterative approach and were performed in parallel and delivered the first version of the IIA assessment tool (IIA version 1.0).

Phase 2: Evaluation

The evaluation phase is an assessment process of judgment and quantification which includes two stages of evaluation. At the first assessment stage, a panel of experts evaluated the IIA version 1.0, focusing on the necessity, clarity, relevance and significance of items' statements. Besides that, experts also assessed the appropriateness and completeness of responses in the IIA tool. The quantification of content validity was done based on the interrater agreement given by all expert panels. The interrater agreement is assessed to decide the degree to which the experts' reliability through their score rating. The four ordinal point scale was used to calculate the interrater agreement for the clarity and representativeness of items given among the panel (Grant & Davis, 1997). The rating provides supplementary information for the researcher to decide the degree to which the items should be changed or deleted (Rubio et al., 2003). Then, the IIA version 2.0 was produced after considering all the feedback about the quality of the developed tool and the criteria to evaluate each item from panel experts. After that, the second evaluation was conducted among the researchers to discuss the second version of the IIA tool. At this stage, the discussion focused on the assessment tool's completeness, understandability and plausibility.

a) First stage evaluation by a panel of experts

The instrument's content validity can be determined using the point of view of the panel experts. The selection of experts must include content and lay experts. Content experts comprise the professionals who understand the assessment instrument method and have expertise in the topic studied, while lay experts are potential research subjects (Rubio et al., 2003). Selecting an expert in a related field may help in deciding the developed tool is well-constructed and suitable for testing (Zamanzadeh et al., 2015). Choosing the number of experts has always been partly arbitrary. For example, Lynn (1986) and Rubio et al., (2003) recommended a minimum of three, but Taherdoost (2016) suggested that at least five experts in conducting content validity to have sufficient control over the chance agreement. Nonetheless, Grant & Davis (1997) stated that the number of panel experts depends on the desired diversity of knowledge and expertise. Most unlikely, not more than ten, even though the number of experts may provide additional information about the evaluation, the chance of the agreement will decrease (Zamanzadeh et al., 2015). Thus, seven experts were identified and invited to participate as panel experts through email. Their involvement is recommended at least a week earlier to provide the subjects time to act in response. Then, the set of the IIA tools include the cover letter explaining the research and validation form which again was distributed by email. Table I shows the characteristics of selected panel experts.

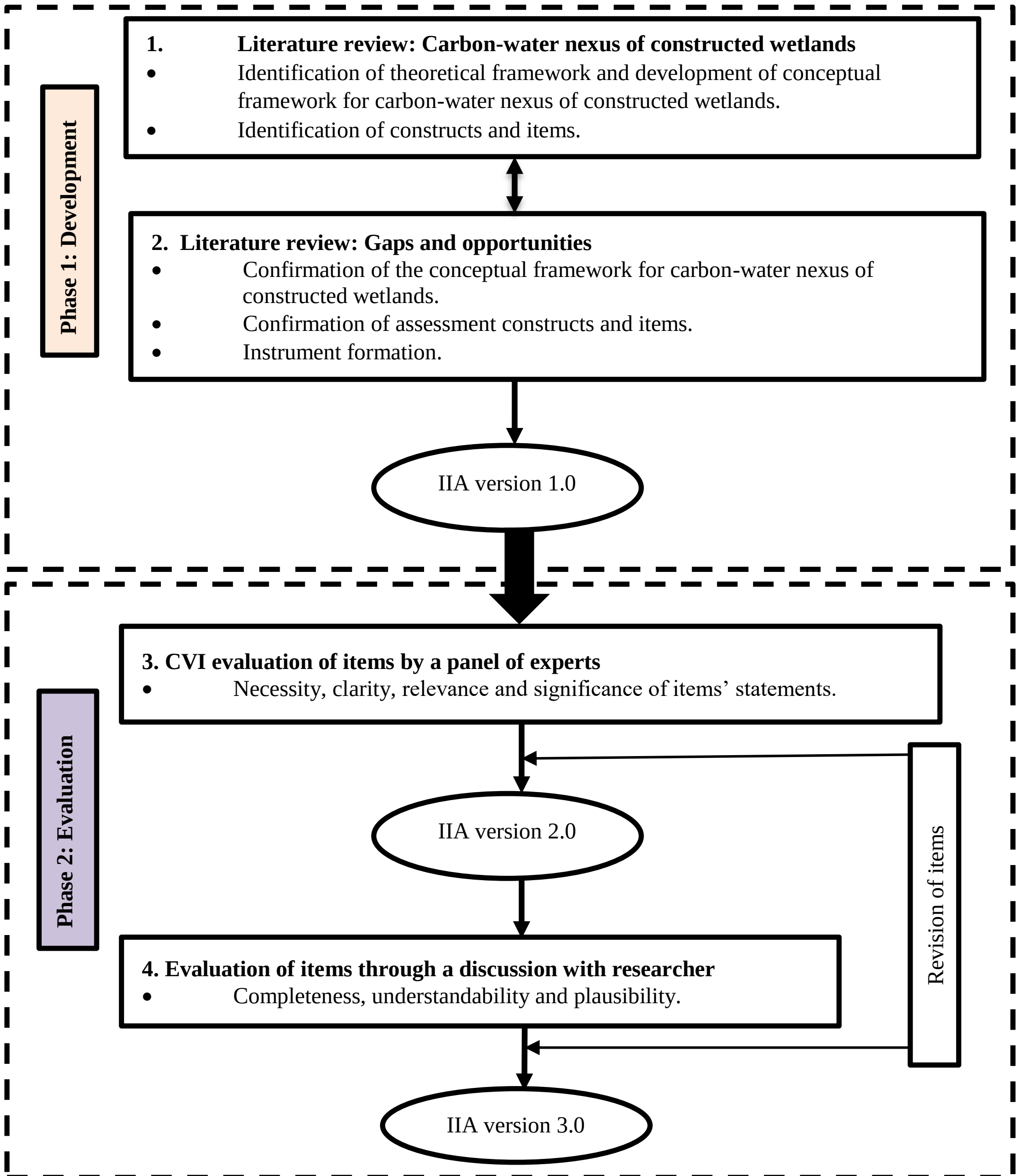

Figure 1. Flow chart of the development and evaluation IIA tool.

b) Quantification of content validity

The content validity of IIA version 1.0 was evaluated by experts using the prepared content validation form, Validation Expert Panel Rubric (VEPR) adapted from White & Simon (2016). This step was taken to ensure that the panel experts' review has a reasonable expectation and perception of their role. In addition, the prepared rubric facilitated the panel experts to evaluate and give recommendations in improving the instrument's overall quality from various aspects, including a) its clarity and understandability, b) the necessity of the statements, c) its relevance towards the aims of the instrument and d) the significance of items' statements. Besides, the panel experts need to evaluate the meaning of items so that it is understood to approach as a targeted layman respondent.

The content validation process was conducted through an online non-face-to-face approach where the validation form was sent by email. Besides that, *WhatsApp's* application was also used to communicate and facilitate the experts' evaluation process. The approach was decided after considering the critical factors, such as time, response rate and cost during the COVID-19 pandemic since it is difficult to gather all panel experts together for the face-to-face approach. Even though the response rate would be the best for the face-to-face approach, but it is expensive and time-consuming, whereby the response rate and time could be the most challenging for the non-face-to-face approach. Although it was challenging to get back the feedback, the most significant benefit was cost savings. Nonetheless, based on Yusoff's (2019) experience, for the non-face-to-face approach, if a structured follow-up is in place, it can increase the response rate and time and be very efficient.

During the evaluation process, the panel experts were asked to identify items that should be retained or discarded according to the study's suitability and encourage to comment and suggest each item. All comments and suggestions were taken into account to improve the construct and its contents. Also, Yusoff (2019) stated that it is good to provide a construct or domain description to make the scoring process easier for the panel experts. Figure 2 shows an example of the instruction and rating scale used in the VEPR form.

Validation Expert Panel Rubric (VEPR) for Intrinsic-Instrumental Assessment (IIA): A Content Validity Evaluation

Prof./Associate Prof./Dr.,

This instrument contains three (3) constructs and 36 items related to nature values: instrumental value and intrinsic value and one open-ended question. Prof./Associate Prof./Dr., expertise is required to evaluate each statement item's suitability based on the construct to be measured. Constructive, critical and objective evaluation is needed based on the following indicator scales: Please tick (√) in the box provided.

Statement suitability level indicator scale:

1 = item is irrelevant to the measured construct
2 = item is somewhat relevant to the measured construct
3 = item is relevant to the measured construct
4 = item is highly relevant to the measured construct

Figure 2. An example of the instruction and rating scale in the VEPR form to the panel experts.

c) The scale of the content validity index (CVI)

Each statement of the IIA was evaluated using an interrater agreement through score rating where the four ordinal point scales were used in this content validity judgment according to the degree of relevance, as below:

1) Irrelevant : the instrument needs to be thoroughly reviewed
2) Somewhat relevant : the instrument needs to be reviewed
3) Relevant : the instrument does not need to be reviewed, but its quality can be improved
4) Highly relevant : the instrument does not need to be reviewed.

The panel experts were asked to rate each item individually using the appropriate scale. All panel experts were given two to four weeks to review and assess the developed instrument of IIA version 1.0. Figure 3 presents an example of the content validation form layout prepared for the panel experts' evaluation.

Next, the data was extracted to compute the CVI upon obtaining completed responses from the panel experts. CVI was calculated at two levels: item content validity index (I-CVI) and average scale content validity index (S-CVI) (Yusoff, 2019). The four ordinal point scale that was dichotomised with the relevance rating must be recorded as 1 (relevance scale of 3 and 4) or 0 (relevance scale of 1 and 2) and counted before CVI can be calculated (Lynn, 1986; Polit & Beck, 2006; Yusoff, 2019). The dichotomised step help researcher in determining the degree to which item is representative and relevant or not, hence, directly assisting researchers in deciding which item needs to be revised, deleted or remain unchanged.

At item level, I-CVI was determined as the number of experts giving a 3 or 4 score rating to the relevancy of each item, divided by the total number of experts. According to Silva et al., (2020), the judgment I-CVI of each item is as follows: only the items with I-CVI greater than 0.80 are considered relevant and appropriate to be held in the instrument, while items with less than 0.80 need revision and resubmission. CVI of less than 0.80 indicates that the instrument's items do not adequately address the thematic domains since it does not pose objectivity and appropriateness. On the other hand, the items were deleted if the I-CVI obtained is less than 0.70. However, Shrotryia & Dhanda (2019) advised that in the case of six or more experts, the I-CVI values cut-off point should not be less than 0.78.

S-CVI is the average of all I-CVI scores of the average of proportion relevance as judged by all panel experts. The S-CVI was determined by the average approach as recommended by Polit & Beck (2006) and the minimum standard index of S-CVI(Ave) is 0.80, up to greater than 0.90 indicating the excellent average as laid out in the guideline by Waltz et al., (2010). The formulas to calculate I-CVI and S-CVI (Ave) are shown in Equations 1 and 2, respectively.

$$I - CVI = \frac{agreed\ item\ (score\ 3\ or\ 4)}{number\ of\ expert} \qquad \text{Equation 1}$$

$$S - CVI(Ave) = \frac{sum\ of\ I{-}CVI\ scores}{number\ of\ item} \qquad \text{Equation 2}$$

d) Second stage evaluation: discussion between the researchers

The second assessment stage with the same panel experts was not feasible due to the instrument's comprehensiveness and the first-panel expert's limited time. Thus, a second assessment was conducted among the research team members. The updated version of the IIA (version 2.0) was introduced and the goals were explained during the discussion which lasted several hours. During the discussion, the team members were asked to assess the items' completeness, understandability, and plausibility. The discussion and proposed changes were recorded, resulting in a new version of the IIA (version 3.0).

<table>
<tr><td colspan="9">Construct 1: Instrumental Value (INS)

Definition: An object or thing has instrumental value when it is used to achieve something of value or a value that has a valuable function to humans. Besides, Piccolo (2017) stated that ecosystems have an instrumental value that needs to be preserved and conserved for human interest. In the context of this study, the instrumental value of constructed wetlands refers to the functions and services of its ecosystem that have the potential to sequester carbon dioxide in the atmosphere to reduce the effects of climate change and at the same time become a water resource for local communities.</td></tr>
<tr><td rowspan="2">Dimension</td><td rowspan="2">No</td><td rowspan="2">Item Statement</td><td colspan="4">Relevance</td><td rowspan="2">Comments</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td rowspan="2">Carbon Sequestration and Climate Change</td><td>INS1</td><td>A healthy wetlands ecosystem consists of wetland elements and various plants that absorb excess carbon in the atmosphere more efficiently.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>INS2</td><td>Constructed wetlands can offset carbon emissions into the atmosphere emitting by households, vehicles and industries.</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Figure 3. An example of the layout content validation form for the panel experts' evaluation.

Results and discussion

Phase 1: Instrument development

In the present study, an instrument for assessing the importance of the nature values of constructed wetland in climate change mitigation and adaptation was developed and validated. The comprehensive literature review identified a few theories, models and instruments focusing on the relationship between humans and nature. For instance, the *Inclusion of Nature In Self* (Schultz, 2002), *Connectedness to Nature Scale* (Mayer & Frantz, 2004) and *New Ecological Paradigm* (Dunlap et al., 2000) were found to be unsuitable for adaptation to evaluate the importance of nature value of constructed wetland. The measurement instruments focused on studying the relationship between man and nature (human-nature relationship) that examines and measures an individual's moral values, behaviours and attitudes towards nature. Unfortunately, the instrument for assessing the importance of the nature value of constructed wetlands is still scarce. Therefore, an assessment tool named 'Intrinsic-Instrumental Assessment (IIA)' developed in this study must be validated to ensure the measurements are relevant and significant with the objective which is to access the importance of constructed wetlands as nature innovation in combating climate change.

The idea of developing this tool was adapted from the *Natural Area Value Scale* (NAVS) by Winter & Lockwood (2004; 2005). Winter & Lockwood (2004) showed that an area of nature's instrumental and intrinsic values could be measured by assessing an individual's perception. Therefore, the development of the IIA tool was based on the proposed conceptual framework of the carbon-water nexus underpinning the nature values (Sandler, 2012) and ecosystem services (MEA, 2005) which is illustrated in Figure 4. The framework has three constructs related to the nature values of constructed wetlands. The instrumental, objective and subjective intrinsic values have a strong relationship with the functions and benefits provided by the constructed wetlands ecosystem services for climate change mitigation and adaptation.

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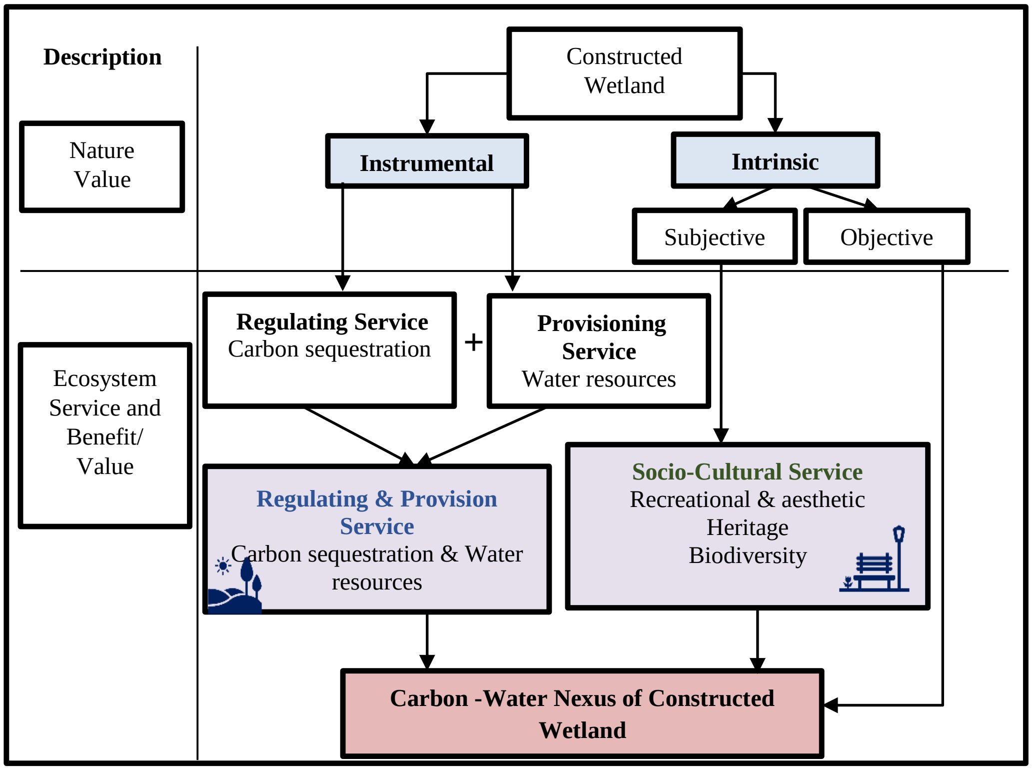

Figure 4. Conceptual framework of carbon-water nexus.

At this phase, 36 items were developed in the first version of the IIA tool with seven dimensions within three constructs. Instrumental value assessment's first construct consists of 18 items comprising three dimensions: carbon sequestration and climate change, water resources and carbon-water nexus. Considering that there are no validated instruments for the objective intrinsic value, this review included seven questionnaires assessing the importance of these values of constructed wetlands. Finally, the third construct is subjective intrinsic value assessment that consists of three dimensions (recreation and aesthetic, biodiversity and bequest values) with 11 items.

Phase 2: Evaluation

a) First stage evaluation by the panel experts

Experts were contacted in the early January of 2021 to get their consent to be a panel expert in this study with an introductory cover letter. Seven experts were invited to participate in the research, of whom six accepted to participate in the content validity analysis of the instrument and one was excluded from the study because of not responding to the invitation. The panel experts' judgment of the content validity was then started on 16 January 2021 until 18 February 2021. As shown in Table 1, the panel experts possess various disciplines and have vast working experience.

The evaluation of the relevance and clarity of each instrument item was a crucial phase for the development since researchers designed the items that considered great nature values of constructed wetlands in the context of climate change. Figure 5 presents the I-CVI for nature values' relevance and clarity of the 36 items analysed by the experts. The blue, orange and green bars represent instrumental values, objective intrinsic and subjective intrinsic values, respectively.

Figure 5 shows that, for instrumental values, only two items obtain 83% agreement among the experts (I-CVI = 0.83) and 100% agreement for the remaining 16 items. On the other hand, experts also show a perfect agreement for objective intrinsic value relevance where out of seven statements, only one statement obtains 83% (I-CVI = 0.83). Besides that, another four items of subjective intrinsic value also obtain I-CVI = 0.83 from an expert. Overall, the item level (I-CVI) shows that 100% (n=36) items ratings are greater than 0.78 with 29 items' score ratings are 1. Thus, it indicates that all the developed items are highly relevant to the studied domain and denotes the high level of agreement among panel experts (Polit & Beck, 2006; Shrotryia & Dhanda, 2019). It also shows that the set of items in the IIA tool version 1.0 have high clarity and are understandable.

Table 1. Characteristics of the panel of experts.

Characteristics of the panel of experts, *N*= 6	
Gender	Two male, four female
Age	35 to 45
Academic disciplines	Sustainability education and environment; Socioeconomic and sustainable livelihood; Environmental law and management; Environmental sociology; Natural and cultural heritage: mangrove ecology, management and conservation; Education language.
Higher academic qualification	PhD
Workplace	Public university
Position	Academician
Professional Working experience	Average 15 years

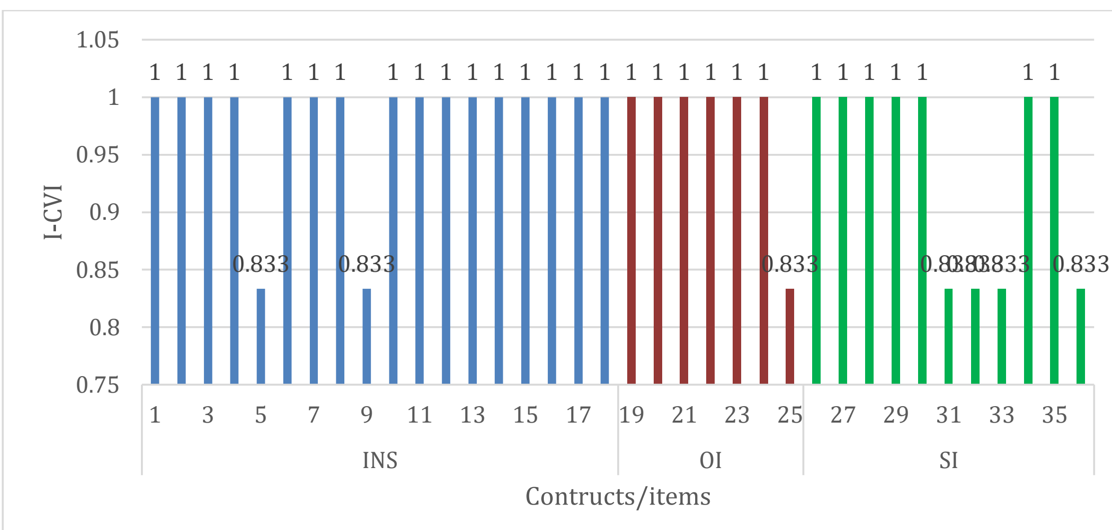

Figure 5. I-CVI for the relevance of items in the IIA tool

Besides that, the calculated S-CVI (Average) is 0.97 as shown in Table 2, showing the entire instrument's obtained excellent average content validity. As a result, these describe the IIA version 1.0 is unnecessary to be revised again by the panel experts. Only a few statements were required to be restructured because of the language and double barrel meaning. Polit and Beck

(2006) proposed standards might require two rounds of expert review if the initial I-CVIs suggest the need for substantial item corrections and improvements or if the reviewers identify aspects of the construct that are not sufficiently covered by the initial items. However, the limitations of content validity studies should be noted whereby experts' responses are subjective; thus, the study is subjected to bias among the experts, though a second evaluation by the researcher may help to minimise this limitation.

The entire data and calculation of I-CVI and S-CVI are presented in Table 2. Based on I-CVI and S-CVI(Ave) calculation, the IIA tool questionnaire scale has achieved excellent content validity (Polit & Beck, 2006) due to the clear conceptualisation of constructs, good items statement, judiciously selected experts and clear instructions to the experts regarding the underlying constructs and the rating task. After that, the instrument was analysed and strengthened based on the panel experts' free-text comments and suggestions. As a result, the IIA tool version 2.0 was generated with the additional 17 items.

Table 2. The relevance ratings on the scale content validity by six experts

Construct	Item	Expert 1 (DD)	Expert 2 (DG)	Expert 3 (DS)	Expert 4 (PA)	Expert 5 (DA)	Expert 6 (IMMY)	Experts in Agreement	I-CVI	UA
INS	1	1	1	1	1	1	1	6	1	1
	2	1	1	1	1	1	1	6	1	1
	3	1	1	1	1	1	1	6	1	1
	4	1	1	1	1	1	1	6	1	1
	5	1	0	1	1	1	1	5	0.833	0
	6	1	1	1	1	1	1	6	1	1
	7	1	1	1	1	1	1	6	1	1
	8	1	1	1	1	1	1	6	1	1
	9	1	0	1	1	1	1	5	0.833	0
	10	1	1	1	1	1	1	6	1	1
	11	1	1	1	1	1	1	6	1	1
	12	1	1	1	1	1	1	6	1	1
	13	1	1	1	1	1	1	6	1	1
	14	1	1	1	1	1	1	6	1	1
	15	1	1	1	1	1	1	6	1	1
	16	1	1	1	1	1	1	6	1	1
	17	1	1	1	1	1	1	6	1	1
	18	1	1	1	1	1	1	6	1	1
OI	19	1	1	1	1	1	1	6	1	1
	20	1	1	1	1	1	1	6	1	1
	21	1	1	1	1	1	1	6	1	1
	22	1	1	1	1	1	1	6	1	1
	23	1	1	1	1	1	1	6	1	1
	24	1	1	1	1	1	1	6	1	1
	25	1	0	1	1	1	1	5	0.833	0
SI	26	1	1	1	1	1	1	6	1	1
	27	1	1	1	1	1	1	6	1	1
	28	1	1	1	1	1	1	6	1	1
	29	1	1	1	1	1	1	6	1	1
	30	1	1	1	1	1	1	6	1	1
	31	1	0	1	1	1	1	5	0.833	0
	32	1	0	1	1	1	1	5	0.833	0
	33	1	0	1	1	1	1	5	0.833	0
	34	1	1	1	1	1	1	6	1	1
	35	1	1	1	1	1	1	6	1	1
	36	1	0	1	1	1	1	5	0.833	0
								S-CVI/Ave	**0.97**	
Mean Expert Propotion relevance		1	0.81	1	1	1	1			
				Mean Expert Average			**0.97**			

b) Second stage evaluation by the researchers

Since the IIA tool version 2.0 consists of additional items, researchers conducted the assessment at the second stage through thorough focus group discussion between team members. The discussion aims to refine items in IIA version 2.0 and determine how the respondent will interpret and understand the items statement well. As a result, the language was again simplified and ensured the wording used is standardised. Furthermore, the instrumental and objective intrinsic values constructs were clarified and restructured to increase the statements' readability. Silva et al.,(2020) emphasised that analysing the language clarity of the items of an evaluation instrument is vital for reducing possible directives and misunderstandings in the process of instrument application. The conversation and proposed changes were recorded, resulting in a new version of the IIA (version 3.0) finalised with 42 items. The instrument was well distributed regarding the number of items in each domain, especially the instrumental and intrinsic values with 20 and 22 items, respectively. Table 3 shows the different items generated from the development and content validation process in both phases.

Developing the IIA tool that is valid and useful to assess the nature values of constructed wetlands is a lengthy process. Even so, the evaluation of content validity should be studied in the first step as an essential step to certify the developed instrument's reliability. In addition, the critical step in this process is most effective when the researcher systematically organised content experts for the judgment-quantification phase of instrument development. Thus, the positive aspect of this study is the novelty of the work. To the best of our knowledge, there is no current validated instrument to measure the importance of nature values of constructed wetlands for carbon-water nexus as a nature solution set to recover the degraded ecosystem of a constructed wetland.

Table 3. Different versions of IIA resulted from phase I and II.

Domains	**Version 1.0 (36 items) Before the expert evaluation as a result of Phase I**		**Version 2.0 (53 items) After the expert evaluation as a result of Phase II**		**Version 2.0 (42 items) After evaluation by the researcher as a result of Phase II**	
	Dimensions	**Number of items**	**Dimensions**	**Number of items**	**Dimensions**	**Number of items**
Instrumental Value	Carbon sequestration and Climate Change	6	Carbon sequestration and Climate Change	7	Carbon sequestration and Climate Change	7
	Water Resources	5	Water Resources	6	Water Resources	6
	Carbon-water Nexus	7	Carbon-water Nexus	12	Carbon-water Nexus	7
Intrinsic Value	Objective Intrinsic	7	Objective Intrinsic	10	Objective Intrinsic	9
Subjective Intrinsic	Aesthetic and Recreation	4	Aesthetic and Recreation	7	Aesthetic and Recreation	5
	Biodiversity	4	Biodiversity	5	Biodiversity	4
	Bequest value (Heritage)	3	Bequest value (Heritage)	6	Bequest value (Heritage)	4

Conclusion

In conclusion, the IIA tool assessment was accomplished in a systematic, subjective and two-phase content validity study process. A comprehensive systematic literature review was carried out at the first phase of instrument development. The following phase was the judgment by panel experts in accordance with conceptual research through quantifying instrument items by content validity index and finalising with focus group discussion among researchers. The quantification of content validity based on CVI (I-CVI and S-CVI) indicates that the developed IIA tool is highly reliable, reflecting the relevant content of constructs and realistic perspectives in the entire instrument. All content validity processes ensure the content of the prepared IIA tool is valid and reliable before it can be further arranged for the subsequent study. Additionally, this study contributes a conducive example to improve the knowledge of conducting content validity for a new instrument. Positively, the developed IIA tool can be used as a new scale to assess the importance of nature values of constructed wetlands in adaptation and mitigation planning to reduce the climate change vulnerability and enhance the sustainable use of constructed wetlands.

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