Content Validity of Collective Efficacy Questionnaire for Natural Disasters Based on Aceh Local Wisdom

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Abstract. Disaster preparedness is one of the efforts to reduce the impact of disasters. This preparedness is very important for people who directly feel the disaster and the impact of the disaster itself. Preparedness behavior in this community can be influenced by collective efficacy, namely the ability of community members to work together and take action in dealing with disasters. For this reason, it is necessary to develop an instrument that can measure collective efficacy in the context of disaster. This research focuses on developing instruments that can measure the collective efficacy of communities in the context of natural disasters based on local wisdom adapted to the local culture of Aceh. Collective efficacy instruments were developed, and content validity was tested. This article describes the procedure for calculating content validity coefficients. The purpose of this study was to conduct content validity of collective efficacy questionnaire for natural disasters based on Aceh local wisdom. Content validity refers to the extent to which the instrument covers the content that is supposed to be measured. Content validity was assessed using a five-point Likert scale and then analyzed using Aiken's V formula to obtain the content validity coefficient. Item analysis was carried out by 7 experts in the fields of psychometrics, social science, disaster science, and measurement who assessed content representation based on construction, relevance, and clarity. As a result, of the 47 items that were validated, 7 items did not meet the valid requirements because the content validity coefficient was below 0.75.

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1 Introduction

Disaster preparedness is one of the efforts to reduce the impact of disasters. This preparedness is very important at the community level, where the community will directly experience and deal with the disaster itself. This preparedness behavior is also supported by the ability of the community to bounce back from events that have occurred. In a study conducted by LIPI [1], it was stated that from the experience of dealing with various disaster events in various parts of the world in the last 20 years, it has been felt the importance of community preparedness, not only at the government or regional level but also at the community level, which directly feels and has to face the disaster itself, especially before aid and assistance arrives from the official disaster management agency or agency. The formation of a community that is ready to face disasters is important.

Preparedness behavior will be easy to maintain if individuals have confidence in the abilities of other individuals in their social environment. An individual's view of the threat of danger involves belief in one's abilities, belief in the social environment, and belief in experts and information sources that are believed to influence individuals to prepare for disasters [2]. Assessing the ability of individuals in a community to identify information, resources, and planning to enhance disaster preparedness is called collective efficacy [3].

Collective efficacy in a group will provide confidence that their joint efforts can produce certain social changes. The efficacy that individuals possess will be shared with other individuals in a group when facing a common task or goal until a shared belief is formed in the group. The community's collective efficacy will influence the community's actions when facing a disaster [3].

Literature discussing collective efficacy shows that environments with higher collective efficacy have few problems or disturbances in their environment, they have a high level of volunteerism, and accompanied by increased resilience in dealing with disasters in their environment [4]. Collective efficacy can increase community resilience in dealing with sudden changes like the natural disasters occur [5]. Groups whose members already have a higher level of perceived collective efficacy were tend to be better prepared for disasters. Groups with high collective efficacy are expected to be better deal with the impact of disasters and have mitigation efforts in the disaster recovery process [6].

This characteristic of collective efficacy is supported from previous research in the field of non-disaster indicate that the beliefs about a group's ability to achieve spesific goals influence perceptions and behavior at the individual level [7]. Research conducted by Babcicky and Seebauer [8] explained that collective efficacy level is analyzed based on several components that effect collective efficacy in communities affected by natural disasters. This collective efficacy affects the community in carrying out protective measures.

Aceh Province as an area that was hitted by the earthquake and tsunami on December 24, 2004, of course, had a high impact on the livelihoods of the people of Aceh. Although the tsunami cause massive sorrow and loss, the tsunami has changed the perspective on disasters from responsive to preventive. One of the efforts to deal with an environment with such various disaster threats is to cultivate and develop resilience. In the context of disaster, resilience can be interpreted as the ability of individuals or communities to adapt and survive in situations that contain disaster threats [9].

The community ability to adapt cannot be separated from the knowledge that has existed and developed for a long time in society that has become a culture. The similarity cultural of a group will lead to actions carried out by the group en masse. The community action forms in a group that generally hereditary was generate from local knowledge or local wisdom of an area. The local wisdom forms can be in the form of values, norms, ethics, beliefs, customs, customary laws, and special rules. Because it has various forms and existed in various society cultures, so the functions is varied [10].

Collective efficacy as a form of individual ability in society will influence disaster preparedness in Aceh people. These is become important because Aceh is an area with high disaster potential based on data from the Aceh Province National Disaster Risk Study 2022-2026 [11]. Community actions or responses in disaster preparedness can be seen based on the collective efficacy level possessed by the community. This action can take the form of knowledge within Acehnese society in the form of local wisdom. This knowledge influences community actions in disaster preparedness.

Despite the previous research, the collective efficacy concept received little attention in disaster-related researchs. Besides that, the collective efficacy concept that has been study in previous research has conducted in western countries, where the cultural context is certainly different from eastern countries. Regarding this, it is necessary to develop a collective efficacy measurement tool in appropriate to disasters and customized to the local wisdom.

Therefore, the focus of this research is to develop a collective efficacy measurement tool for natural disaster to measure the collective efficacy level in community, adjusted to the culture or local wisdom in Aceh. The measuring tool in the form of a collective efficacy questionnaire is expect to be one way to measure the community collective efficacy level in dealing with disasters.

To prove whether the collective efficacy measure optimally construct is to evaluate the quality of the measuring instrument. There are various opinions about the validity of the instruments that used as measuring tools in the fields of education and psychology. Messick [12] defines validity as an integrated evaluative policy about the extent to which empirical facts and theoretical reasons support the adequacy and suitability of inferences and actions based on test scores or scores of an instrument. According to American Educational Research

Association, American Psychological Association, and National Council on Measurement in Education [13] in Standards for Educational and Psychological Testing, validity refers to the degree of facts and theories that support the interpretation of test scores and is the most important consideration in test development. Based on this, the most significant consideration in evaluating the quality of measuring instruments as a measuring instruments is validity.

This article discusses the validity of evidence based on testing the collective efficacy questionnaire instrument for natural disasters based on Aceh local wisdom. The aim is to describe evidence of content validity based on expert judgment.

This type of validity can give confidence to the readers about the developed instrument. By reading this article, readers can understand how to collect and analyze valid evidence with expert judgment to evaluate the use of measuring instruments.

2 Research methods

2.1 Instrument development

In principle, research is taking measurements. Taking measurements needs good measuring instrument. Measuring instruments in research are usually called research instruments. The research instrument is a tool used to measure observed natural or social phenomena. These phenomena are refer to as research variables. The research variables use for research must be defined, and the indicators use to be measured must be determined. These indicators are further elaborated into questions or statements [14]. Measurements made to obtain valid, reliable, and objective research data.

Sugiyono [14] explained to obtain valid, reliable, and objective data, research must be use valid and reliable instruments. Therefore, the research instruments compiled must be accurate and relevant. For the research instrument to fulfill this, the instrument prepared must meet the requirements for the preparation of a good instrument. The requirement for a good instrument is to fulfill the criteria of validity and reliability [15].

The research begins with a literature study related to collective efficacy, information and findings are obtained that studies related to collective efficacy most done in non-disaster contexts and originate from international literature. From this, it is also seen that existing instruments are related to collective efficacy that in the form of a questionnaire to assess the collective efficacy level in a group.

Instrument development begins by conducting research on collective efficacy theories, constructs supporting collective efficacy, and indicators supporting the construct. In developing this instrument, instrument items adjusted to local culture or local wisdom in Aceh. The instruments compiled were in the form of statement items developed from each construct and its indicators. At this stage, a collective efficacy instrument is produce in the context of disaster based on Aceh local wisdom.

The statement items in this instrument are composed of 4 constructs related to collective efficacy, that are social cohesion, social support, self-efficacy, and perceptions of disaster risk. The collective efficacy instrument is composed of 47 statement items. This questionnaire instrument is use to measure the collective efficacy level.

2.2 Research procedure

The content quality of a measuring instrument that has develop must evaluated with content validity. Haynes [16] reveals that content validity is the extent to which the elements in a measuring instrument are relevant and represent a construct that follow the measurement objectives. Content validity refers to the instrument content, namely the linearity of constructs, indicators, and items. Instrument items must be derived from indicators and constructed linearly and rationally, so it is needed review from experts to ensure their linearity. Content validity is determined using expert judgment, because the measurement instrument is proven valid if the expert believes that the instrument can measure the abilities to defined in the measured construct.

According to Azwar [17], the content representation can be estimated by testing the its feasibility or relevance of the content through rational analysis by competent experts (expert judgment). Expert judgment is a process to assessing the feasibility or relevance of content [18].

Content validity test by expert judgment done by assessing the items on the instrument in terms of construction, relevance, and clarity. This assessment involved experts in several fields, psychometrics experts from the Faculty of Medicine USK (3 experts), social science experts from the Faculty of Social and Political Sciences USK (2 experts), disaster science expert from the Postgraduate Program USK (1 expert), and measurement expert from the Faculty of Teaching and Education Faculty USK (1 expert), a total of 7 expert judgments.

Data is collected using validation sheets given to experts where each expert assessed each item in the questionnaire instrument. Each expert was given a validation sheet containing 47 statement items by assessing based on the construction, relevance, and clarity of each test item on a five-point scale (Table 1).

To see consistency between experts, namely expert assessed to item representation based on construction, relevance, and clarity, is use validity index. The content validity index was calculated using Aiken's formula (V). The basis for calculating the validity index is the result of the assessment expert as many as "n" people to an item in terms of the extent that represents the measured construct. Aiken's Formula (V) is formulated by:

$$V = \frac{\sum s}{n\,(c-1)},\ s = r - l_0 \qquad (1)$$

Where is the value "s" is obtained from the figure given by expert (r) minus the lowest validity rating score (l_0), and "c" is the highest validity assessment

score. Aiken's index (V) ranges from 0 - 1, which indicates the agreement of the experts in evaluating items and the statistical significance.

Table 1. Content validity measurement criteria

a. Construction 1 = poor 2 = fair 3 = average 4 = good 5 = very good
b. Relevance 1 = not relevant 2 = item needs revision 3 = item needs some revision 4 = relevant but need minor revision 5 = very relevant
c. Clarity 1 = not clear 2 = item needs revision 3 = item needs some revision 4 = clear but need minor revision 5 = very clear

2.3 Data analysis

The method used in collecting valid evidence with expert judgment are to (1) assess the extent which the items are relevant to the construct, (2) assess the extent which the items are constructed, and (3) assess the extent which the items used are clear [19]. This study uses a rating scale Likert scale to measure the suitability of each item with the collective efficacy construct where experts asked to assess the instrument statement items. An example of an item construction rating scale is shown in Table 2.

Table 2. Example of an assessment expert to item construction

Item	Statement	Construction				
		1	2	3	4	5
1	The people in my village are generally trustworthy.					
2	The people in my village are generally fair.					
3	The people in my village live in harmony with each other.					
…						
47	Rumoh Aceh (house on stilts) can be a safe building during a flood disaster.					

The experts evaluate each statement item in terms of construction, relevance, and clarity of the item based on the construct. Assessment uses Likert scale by giving a value to each statement item.

3 Results

This approach by rating scales can help to obtain information on how well an item measures certain objectives, and whether these items measure the intended purpose. A summary of data from the results of expert judgment shown in Table 3.

Table 3. Example of item construction results

Item	Statement	Mean	Median	V
1	The people in my village are generally trustworthy.	4,00	4	0,750
2	The people in my village are generally fair.	4,00	4	0,750
3	The people in my village live in harmony with each other.	4,14	4	0,786
...				
47	Rumoh Aceh (house on stilts) can be a safe building during a flood disaster.	4,29	5	0,821

Note: Statistics based on the ratings of 7 experts with a rating scale1 = poor, 5 = very good

The Aiken index (V) with a values ranging from 0 – 1 shows expert agreement in assessing items and their statistical significance can be evaluated [20]. To be statistically significant, an item content validity analysis using the Aiken index with seven experts must produce a V index greater than or equal to 0.75 [21]. This value is taken from the table right-tail probabilities for selected values of the validity coefficient which was established by Aiken.

The results of the content validation by the expert calculated the validity index using Aiken's formula with criteria ≥ 0.75. If the Aiken's (V) index ≥ 0.75 then there is an agreement between the experts stating that the item is relevant to the specific content. When Aiken's index (V) < 0.75, the agreement between experts states that the item is not relevant to the specific content. A small Aiken's (V) index value for an item indicates a lack of agreement between experts regarding the relevance of the item to the specified content.

Table 4 displays the Aiken's index from 7 experts assessment of the construction, relevance, and clarity of the collective efficacy measurement instrument items. The analysis results show that the collective efficacy instrument for natural disasters based on Aceh local wisdom has a good representation where the items are relevant to the construct.

Based on the validation results, the Aiken's index ≥ 0.75 is in almost all items. However, the Aiken's index identified 7 statement items where the construction, relevance, and clarity of the items had an index of < 0.75 (items 5, 18, 33, 34, 35, 38, and 39). The 7 statement items do not meet the Aiken's index requirements. Of the 47 statement items, 40 items that have a validation index in terms of construction and relevance greater than 0.75. However, several items have a validation index in terms of clarity that is less than 0.75.

Table 4. Outcomes Aiken's V index for 47 items of item construction, relevance, and clarity results

Item	V		
	K	R	C
1	0,750	0,750	0,607*
2	0,750	0,750	0,607*
3	0,786	0,786	0,786
4	0,786	0,750	0,750
5	0,714*	0,679*	0,679*
6	0,786	0,750	0,679*
7	0,821	0,786	0,786
8	0,857	0,821	0,821
9	0,821	0,750	0,750
10	0,786	0,750	0,714*
11	0,786	0,786	0,714*
12	0,750	0,750	0,679*
13	0,750	0,750	0,679*
14	0,750	0,750	0,714*
15	0,786	0,821	0,786
16	0,786	0,786	0,750
17	0,750	0,786	0,714*
18	0,679*	0,714*	0,643*
19	0,750	0,750	0,714*
20	0,750	0,750	0,714*
21	0,821	0,821	0,786
22	0,750	0,750	0,679*
23	0,750	0,750	0,679*
24	0,786	0,821	0,786
25	0,786	0,821	0,786
26	0,786	0,821	0,786
27	0,786	0,821	0,786
28	0,750	0,750	0,714*
29	0,750	0,750	0,750
30	0,786	0,786	0,786
31	0,750	0,786	0,750
32	0,750	0,786	0,750
33	0,607*	0,643*	0,643*
34	0,643*	0,679*	0,643*
35	0,643*	0,679*	0,643*
36	0,714*	0,750	0,714*
37	0,750	0,786	0,750
38	0,643*	0,679*	0,643*
39	0,643*	0,679*	0,643*
40	0,821	0,857	0,786
41	0,786	0,821	0,750
42	0,786	0,821	0,750
43	0,857	0,929	0,821
44	0,750	0,786	0,679*
45	0,750	0,786	0,714*
46	0,786	0,857	0,750
47	0,821	0,857	0,821

Note: The V index value based on the Aiken's (1985) table of values is 0.75. Items that do not meet the Aiken V index are noted with *.

Seven (7) items that did not meet the requirements assessed by experts were items that had inappropriate construction, relevance and clarity, so they had to be removed from the construct. These seven items do not describe their suitability to the construct. The seven items are (5) The people in my village make the village environment be a better place to live, item (18) The people in my villages will help me if a natural disaster occurs, item (33) In my opinion, the environment where I live is at risk of disaster volcanic eruptions, item (34) In my opinion, the environment where I live is at risk of flooding, item (35) In my opinion, the environment where I live is at risk of landslides, item (38) In my opinion, the environment where I live is at risk tidal wave/abrasion disasters, and item (39) In my opinion, the environment where I live is at risk of land and forest fire disasters. These items are considered irrelevant to the conditions of villages in all places in Aceh, such as items 33, 34, 35, 38, and 39, not all places are at risk of volcanic eruptions, floods, landslides, tidal waves/abrasion, and land fires, so it becomes irrelevant.

A content validity index value ≥ 0.75 indicates a significant standard has achieved. The content validity assessment for each item shows that the 40 statement items have good content validity and these items are effective measurement instruments.

The validity of the instrument or measuring instrument aims to see the accuracy of a measuring instrument in carrying out its measuring function. Instruments that have validity criteria, and the items in them can reveal what is to be disclosed. A measuring instrument is said to have high validity if the measuring instrument carries out its measuring function, or provides measuring results that are following the purpose of the measurement. A valid instrument means that the measuring instrument used to collect data is valid. Valid means that the instrument can be used to measure what should be measured. The discussion of validity in this study focuses on matters relating to content validity testing. To test the validity of this content requires expert judgment that is recognized in their field to assess whether the statement items are following the construct [19]. The procedures reviewed in this article will assist in the development of instruments to evaluate construct representativeness items.

4 Conclusion

This article presents the process of validating the contents of a collective efficacy questionnaire for natural disasters based on Aceh local wisdom. The content validity test was carried out by seven experts in the fields of psychometrics, social science, disaster science, and measurement.

The results of the content validity test show that of the 47 statement items, there are 40 items from the instrument of collective efficacy questionnaire for natural disasters based on Aceh local wisdom which have a good content validity index value, namely with a value of Aiken's V index ≥ 0.75. There are seven items that do not meet the content validity requirements with value Aiken's V index < 0.75, so they have to eliminated. This research reveals that the instrument of collective efficacy questionnaire for natural disasters based on Aceh local wisdom is an appropriate measurement instrument based on content

validity results. This instrument is intended to measure the collective efficacy level of Aceh people in facing disasters.

In this research, the study was not only restricted to content validity but has been carried out to construct validity and construct reliability. In the future, it expected that this instrument can be further refined because instrument still has several limitations. It is expect that the limitedness in the development of this instrument can be overcome in future studies. These limitations include the limit of respondents that respondents do not yet represent all regions in Aceh with their respective local wisdom characteristics. Furthermore, it is limited to distributing questionnaires that only distributed online, so the respondents are limited to people who only understand the internet, so they cannot reach people who understand local wisdom more deeply.

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