Research Article

Content Validity Of A Self-Reported Instrument For Safety And Health (S&H) Culture Practice In Paramedic Training Institute Using A Heterogeneous Expert Panel

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Abstract : Background: Although there is comprehensive coverage of studies conducted in safety and health management, practice, and performance, there is a limited study focusing on health professionals in paramedic training institutions which can be considered a low-risk workplace setting. Besides selecting heterogenous experiential experts in assessing new instruments', to our knowledge, the content validity on the topic has not been well described in the literature. Hence, the purpose of this study was to describe the use of experiential experts in a content validity evaluation of a new self-reported questionnaire to determine the safety and health culture practice in paramedic training institutes.

Methods: This study involved two phases, instrument design and judgemental evidence. A panel of nine experts was involved in validating this questionnaire. They were five experiential industrial safety and health specialist, and four professional occupational health researchers or trainers. The quantitative content validity index (CVI), Item-CVI (I-CVI), and Scale-level CVI (S-CVI) were used to make decisions on items in the instrument whether to retain or remove the items.

Results: Results showed good content validity of individual items (I-CVI range: 0.70 to 1.00) and excellent overall scale content validity (S-CVI = 0.97). There were 44 initial items, and the item was accepted when it obtained a minimum score of at least 0.80. Most of the items were retained (n = 42), and only two were eliminated, which was considered not relevant by the judges. Five dimensions have been identified, safety and health system (five items), safety and health risk management (four items), safety and health competency (three items), safety and health management/supervision (ten items), and worker involvement in safety and health (three items).

Conclusion: Good content validity index from an expert view of each item's content and relevance to be included as a safety and health culture practice indicator for paramedic training institute. Although a new instrument's content validity seems costly in terms of time and human resources, its value deserves more attention in developing valuable and valid assessment tools.

Keywords: Content validity, Content validity expert, Safety and health culture practice, Paramedic, Training institute.

Introduction

An organization's safety culture is the product of individuals and group values, attitudes, competencies, and patterns of behavior that determine the commitment to and the style and efficiency of an organization's safety and health (S&H) management. Guldenmund (2000) and Zohar (2010) highlighted that safety culture is an essential principle in the new approach of improving the outcomes of safety performance. However, there is no definite agreement on the definition of safety and health performance in the literature. Most scholars define the meaning based on what they experienced (Yu-Jung, Jin-Luh, Shyh-Yueh, Ming-Tsai, & Chen-Hua, 2013). Wu, Chen, & Li (2008) defined safety culture as the safety and health management system's performance. Some others defined safety performance as an organization's ability to prevent occupational-related incidents or injuries (De Koster, Stam, & Balk, 2011). Although there are various studies in high-risk industries, very little explore safety and health practices in public services and statutory authorities. Also, no theoretical guideline and rule available to determine the relationship of safety culture elements with safety performance (Nor Kamilah, Balakrishnan, Mohd Nazri, Ahmad Rasdan, & NurulHusna, 2018). Organizational management is critical in determining the overall success of operations (Norazmi et al., 2019; Norazmi, 2020; Fauziyana et al., 2021; Rosnee et al., 2021; Roszi et al., 2021; Zaid et al.,

2020; Zaid et al., 2020; Zaid et al., 2021). Leadership underpinned by trust and confidence is also important in determining the success of an organization (Azlisham et al., 2021; Aminah et al., 2021; Ishak et al., 2021; Firkhan et al., 2021; Een et al., 2021; Nik Nurharlida et al., 2021). Thus, to fulfill the gap, there is a need to identify and validate an appropriate instrument to test S&H culture factors tailored explicitly to the paramedic training institute, which may improve S&H performance and reduce accidents and injuries, fatalities, and illnesses.

Polit, Beck, & Owen (2007) had traced various methods available and their progress in assessing instruments' content validity under development. From the literature, Mary R. Lyn (1986), the pioneer, developed content validity in nursing research, defined content validity as a process by which content validity should be determined, and showed the methods involved to quantify it by a two-stage (development or judgment) process. It begins first with identifying all measured elements, then items for the construct. Lynn also recommends assigning an experiential panel of experts to the study instrument area to assess the construct's content validity. Lynn's development in the content validation process has become a requirement in nursing studies and many other disciplines too for instrument development (Polit, Denise F, and Beck, 2004). Most studies recommended the panel of experts must be someone familiar with the topic contained (Davis, 1992; Grant & Davis, 1997; Mary R. Lynn, 1986; Slocumb & Cole, 1991), the conceptual framework underlying the instrument (Davis, 1992; Grant & Davis, 1997) and instrument development (Davis, 1992; Slocumb & Cole, 1991). In this article, the panel of experts assigned are experiential experts, reflecting a group of an expert with vast experience in safety and health.

The purpose of this article is to describe an approach for assessing the content validity of an instrument for safety and health culture practice indicators and performance tailored for paramedic training institute using experiential experts (S&H specialists and professionals). This approach can provide an adequate assessment of the instrument's content validity after a comprehensive view of the literature. Before the panel of experts' assignment, they have to meet certain criteria to make them eligible to be the experiential expert judges. The quality of the expert panel will produce a successful study (Rajendran & Gambatese, 2009). As for the criteria for adequately identifying safety and health experts, specificities highlight the selection criteria as follows. A study by Rogers and Lopez (2002) identified qualified experts should meet two out of five requirements. Being a member or chair of the committee, book authorship, employed in practice, or be a supervisor with five years' experience, been as the conference participant and employed as a faculty member with a specific interest in the area. A more recent study by Rajendran and Gambatese (2009) established eight criteria for a safety and health expert. An expert should have at least three out of the eight requirements. The requirements are; having presented in the conference; has significant work experience; education qualification; authorship; had related professional license, a safety association, and participated in its faculty position and book authorships.

Although the criteria discussed in the literature vary, there are no standard requirements or inclusive criteria to achieve the minimum standards. Therefore, in this study, the researcher had adopted the process of identifying a potential panel of experts based on literature that suits the research objectives. Thus the panel of experts for this study was expected to fulfill at least three out of the eight following requirements, which are 1) had a minimum of five years of work experience in either academia or industry, 2) had at least one professional qualification, 3) an editor of a book, or chapter authorship, 4) had the minimum qualification for Ministry of Health (MoH) practitioners, or teaching diploma or academics bachelor degree, 5) had minimum five or more publications in conferences and journals, 6) a member or chairperson of safety and health committee in faculty/institute, 7) Department of Occupational Safety and Health (DOSH) enforcer, 8) training center in safety and health such as NIOSH Malaysia. An invitation email will reach the potential panel of experts. The researcher will also inform them of the objectives and the period of the study.

Heterogenous types of experts are assigned, indicating that different experts will provide unique contributions to enhance the instrument's content validity. A classical approach for measuring content validity calculates the content validity indices (CVI)(Mary R. Lynn, 1986). Polit et al., (2007) recently presented the definitions and ways to calculate for both item-level CVI (I-CVI) and scale-level CVIs (S-CVI). Nevertheless, in the literature, some nursing research studies showed significant numbers of researchers assigning two groups of experts using experiential experts and traditional experts to evaluate the content validity of newly developed instruments. However, Polit and Beck never consider the need or importance of calculating more than one I-CVI when the researcher wants to decide whether to accept, remove, or revise items for the newly developed instrument.

1. Method

2. Development, translation, and validation of the instrument

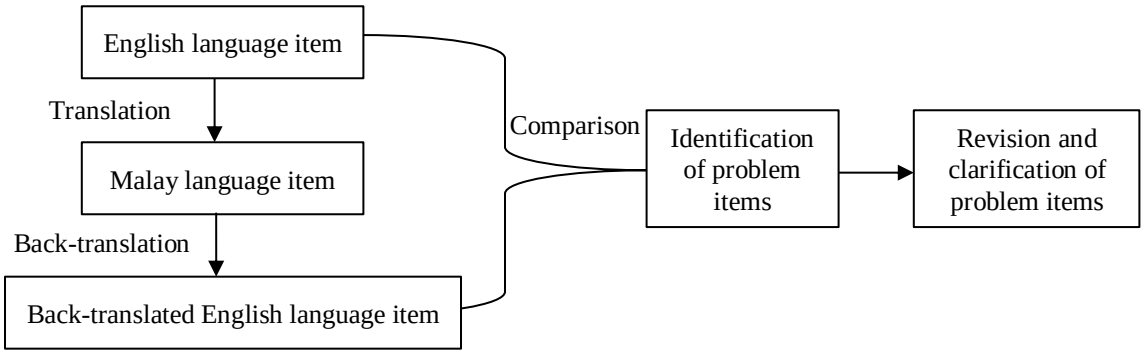

Figure 1: Flow diagram of the translation and validation processes

The questionnaire was developed based on an extensive literature search related to safety and health culture practice and performance. Previous studies had formulated and identified safety and health culture practice elements and statements. (Fernández-Muñiz, Montes-Peón, & Vázquez-Ordás, 2007; Chinda & Mohamed, 2008; Rajendran & Gambatese, 2009; Molenaar, Park, & Washington, 2009; J. Agumba, Pretorius, & Haupt, 2013; Cooper & Psychol, 2016; J. N. Agumba & Haupt, 2017; Saadiah et al., 2021). The questionnaires formulated previously had covered all the main elements in the conceptual framework. The elements of safety culture practice comprised management and supervision on S&H, workers' involvement in S&H, S&H risk management, S&H systems, and S&H competence. Safety and health performance elements were the number of incidents, number of incident-related costs, positive morale, absenteeism, and safe work practice. The questionnaire was divided into three sections. Section A, the background and sociodemographic information such as job title and years of work experience, age, gender, incidence data within the institutes they are working in, and incidence types. Section B is related to the institute's existing safety and health culture practice based on their perception, and Section C is the questions related to their perception of how the safety and health culture practice might improve their safety and health performance in the institute. The back-to-back translation method of the questionnaire was employed (Richard W. Brislin, 1970). The English language's original items were translated to Bahasa Malaysia and re-translated back to the English language version. To perform this translation process, the researcher had sought assistance from a linguistics expert of both languages from University Sains Malaysia. There were two meetings in a week to discuss and ensure the correct meaning from the original items. Consequently, the comparison between the original English version and Bahasa Malaysia translated version also back-translated showed no difference. This study had included a statistician from University Teknologi Mara Malaysia (UiTM), one member of the Occupational Health and Safety expert panel from Universiti Malaysia Sabah (UMS), and the supervisors of this research project to peruse the questionnaire for clarification. Changes made according to these experts' recommendations.

2.1.1 Experts' agreement on the relevancy of items

Fifteen occupational safety and health specialist English questions occupational health trainers/ researchers were invited by e-mail to be an expert professional validity panel of the assessor. However, only nine experts have agreed to serve as judges. All nine panels of experts had met the inclusion criteria where they had at least three out of the eight following requirements which are 1) had a minimum of five years of work experience in either academia or industry, 2) had at least one professional qualification, 3) an editor of a book, or chapter authorship, 4) had the minimum qualification for Ministry of Health (MoH) practitioners, or teaching diploma or academics bachelor degree, 5) had minimum five or more publications in conferences and journals, 6) a member or chairperson of safety and health committee in faculty/institute, 7) Department of Occupational Safety and Health (DOSH) enforcer, 8) offers workshop or training in safety and health such as NIOSH Malaysia before the questionnaire's distribution. The research then mailed all of them a cover letter and content validity questionnaire. All nine panels of experiential judges returned questionnaires. The experiential experts were also briefed on how to assess the questionnaires. The items chosen must be related to S&H culture practice, and performance indicators must be based on their expert judgment and previous experiences. They will decide whether each item was relevant and clear and appropriate for each category/construct. Experts were reminded to rate the items specifically suitable for a paramedic training institute and not based on how the items applied to themselves in their respective organizations. In total, the nine experiential panels of judges evaluated 44 items in the questionnaire. The content validity questionnaire gave

chances for an expert to rate each item for its relevance to each dimension of safety and health culture practice and performance using a 4-point Likert scale: 1 = not important, 2 = fairly relevant, 3 = very relevant, 4 = extremely relevant. The wordings of the four ratings were used as stated by Davis (1992). The experts were also allowed to comment on any items in the review form to easily understand the item.

2.1.2 Statistical analysis

All data gathered in this study were analyzed using Microsoft Excel and IBM SPSS version 21. The descriptive analysis presented the background and characteristics of S&H, such as their experience, qualification, publication in conferences and journals, chapters or books written, conducting training in S&H, and current designation of respondents.

The researcher had coded every item evaluated by the expert panel as "Relevant" (represented by value =1 for the index) when the expert validator scored the item as "Very relevant" or "Extremely relevant." On the other hand, the item was coded by the researcher as "Not relevant" (represented by value = 0) if the expert or content validator has scored the item as "Not relevant" or "Fairly relevant." This method is following the protocol described by Davis (1992). An I-CVI value was calculated by reckoning the total number of items rated as "Relevant" for the Index responses, divided by the total number of experts involved as content validators. For instance, if there are nine panels of experts and seven of them rated an item as "Very relevant" or "Extremely relevant," the I-CVI score for the item would be 0.78.

Meanwhile, to calculate the S-CVI score, the researcher calculated the mean of all 42 I-CVI scores. Thus, items were assumed to meet the validation threshold when they displayed a value of an I-CVI of more than 0.78 and an S-CVI value larger than 0.90 (Polit et al., 2007). Besides calculating I-CVI and SCVI scores, the researcher also took into account all comments related to items by the content validators.

3. Results

3.1 Demographic characteristics of the expert panel

A list of Occupational Health and Safety expert was identified through purposive random sampling. The table below confirmed that all the expert has met the inclusive criteria based on their expertise in the field. Heterogenous types of experts that coming both from academia and industry made the required data more reliable and also eliminated biases from the responses. Almost all of the experts (80 to 100%) held a professional license in safety and health, performed duties as safety and health committee in their organizations as well as actively involved in journal publication writings, had book authorship, and involved in conferences. The rest of the demographic characteristics of the expert panel is shown in Table 1 below.

Table 1: Demographic of the panel of experts

Demographic variable	Number of respondents	Percentage (%)	Mean (SD)
Gender			
Male	5	55.5	
Female	4	44.5	
Current Employer			
Ministry of Health	1	11	
DOSH/NIOSH	2	22	
University	2	22	
Industry	4	45	
Highest Degree Qualification			
Degree	6	67	
Master	1	11	

PhD	2	22	
Number of years as practitioner in industry			9.75 (0.50)
0-5 years	0		
6-10 years	4	100	
Number of years in academia/training			8.8 (0.45)
0-5 years	0		
6-10 years	5	100	

3.2 Validation of instrument based on experts' agreement

The I-CVI value is reflecting the proportion of experts that gave a rating of 3 = very relevant or 4 = extremely relevant. The I-CVIs were then calculated for each item for the total group (n = 9; S-CVI). Conventionally, I-CVI is calculated for each item for the entire panel of experts. Researchers will then select the value of I-CVI. According to Stewart et al., (2013) and Polit et al., (2007), the acceptable I-CVI rate is 0.80 with the term of more than three experts assigned, while the value of 0.90 showed an excellent face validity value. Lynn (1986) had prepared a table of cutoff values of I-CVIs based on the total number of expert judges, with a maximum of 10 judges. In the table, it can be concluded that the greater the number of judges, the lower the required I-CVI. However, the value of CVI below 0.78 is unacceptable based on Lynn's recommendation. A recent review also suggested similar values of not lesser than 0.78 when 6 to 10 experts are assigned and an I-CVI value of 1.00 when only three to five experts are involved (Polit et al., 2007).

Therefore, in this study, a cutoff of 0.80 was used for the analysis of experiential experts' agreement. The I-CVI of two items out of 44 was found not to meet the cutoff value of 0.80. Therefore, 2 of the items were removed from the instrument. After that, the instrument was reviewed with the remaining 42 items, it was then revised. The item wordings and phrase constructions were corrected according to experiential experts' suggestions (Table 2). The CVI for the entire instrument were computed by averaging ICVIs across items, (Polit et al., 2007), which was calculated to be 0.97.

Table 2: Examples of Eliminated and Revised Items

	Sample item	I-CVI value (n= 9)	Expert's comment/recommendation if applicable
	Eliminated item		
1	Management should provide books related to safety and health acts and regulations.	0.78	Most of non-qualified safety and health staff are not well versed with the written acts and regulations. Effectiveness in improving performance is somewhat arguable.
2	Management provides training notes for staff at each safety and health training for staff's reference	0.78	Training is more efficient when involving activities related to the training's content. Providing training material somewhat is less effective because it is usually to be kept only on worker's shelves
	Revised item		
1	Management should appoint at least one qualified staff with S&H training to become secretary of the S&H committee	0.89	Only meant for qualified staff was stated in the regulation for safety and health committee. This item involving qualifies person thus to be placed under the "competence" construct.
2	Management gives staff the right to refuse to work in unsafe or unhealthy conditions	1.00	To revise the wording and to add in options such as working from home since in situations like COVID-19 pandemic, working in unsafe conditions would include those with certain

			hazards.
3	Management involve staff in the preparation of S&H rules and safe work procedures	1.00	Paramedic training institutes involve many field expert/experienced tutors. Should rephrase and revise the wordings to include staff with specific expertise in their area to get involved in safety and health/contribute in preparing procedures for the institute.

4. Discussion

Extensive use of literature and the approach to assigned safety and health specialist from industrial and occupational health professionals as experiential expert content validity judges had produced the required information on the benefit of experiential experts to function in this paramedic training institute where a little study has been performed before. The assumption was that these experiential experts might assist in rating the items based on whether these items were practical to all dimensions of safety and health culture practice and the performance in the instrument was rated based on how important they were. The methods applied for experiential experts in the current study was previously discussed in another article (Devriendt et al., 2012), however, this current study used a valid technique of experiential experts among the safety and health specialist and professionals.

There were 44 items in the instrument which were reviewed by experts with an excellent overall S-CVI of 0.97 and the I-CVI for 42 of the items were found more than 0.80. Two of the items were below than acceptable value, thus were eliminated. This is because the experts decided that the items are less relevant for paramedic training institutes. When researchers reviewed the comments of professional experts on the item with lower than 0.80 I-CVI value, there was a comment such as: "Most of non-qualified safety and health staff is not well versed with written act and regulation. Effectiveness in improving performance is somewhat arguable." Hence, researchers suggested that the competent person or trainer can simplify important and relevant information from the act and regulation book and train the training institutes on its application. This opinion is also as advocated by Findley et al. (2004) where an appointment of safety and health competent staff has been found to influence an organization's performance. Another item that was removed received an expert's comment like "Training is more efficient when involving activities related to the training's content. Providing training material somewhat is less effective because it is usually to be kept only in worker's shelves". This is kind of familiar with the result from content validity study conducted in construction's small and medium enterprises (J. Agumba et al., 2013) where the expert judges don't agree for written communication that much where safety data sheet shouldn't be provided to the worker at the site because it doesn't influence the workers' safe behavior and don't last long in staff's possession. Hence, the experiential experts' comments were all taken for improvement for this paramedics training institute's study. Finally, this newly-developed instrument is said as a relevant, validated, and possibly functional tool to assess safety culture practice and performance in a paramedic training institute. Moreover, the authors are convinced of its strength where it is the only general safety and health culture practice instrument available for this type of organization and ready to be used by a similar type of organization. Other measures have been developed but for the larger and riskier organization. On the other hand, the validation results reported in this paper feel the necessity for confirmation by other investigators as instrument validation is an advancing process.

5. Conclusion and Recommendation.

In conclusion, two items were removed, three were revised, and 42 have remained. This study has demonstrated the content validity process of S&H culture practice and performance as a tool that can be introduced in all kinds of training institutes to improve workers' safety and health culture practice and process outcomes to S&H performance. Although a new instrument's content validity seems costly in terms of time and human resources, its value deserves more attention in developing valuable and valid assessment tools.

6. Ethical considerations

This research has been approved by the Medical Research Ethics Committe (MREC) (NMRR-20-994-54102 (IIR) as well as from the Research Ethics Committee of the Universiti Teknologi Mara Malaysia (REC/07/2020 (MR/152).

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