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ASSESSING THE CONTENT VALIDITY OF HOSPITAL DISASTER RESILIENCE ASSESSMENT INSTRUMENT

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Graphical abstract

	Organisation	Designation	Background	Exp.
R1	Ministry of Health Malaysia	Government Security Officials	Health & Safety	30
R2	Government University	Academician	Health science	30
R3	Government University	Academician	Civil engineering	23
R4	Government University	Academician	Construction	30
R5	Government Hospital	Emergency physician	Emergency medicine	16
R6	MERCY Malaysia	Head of technical team	Architecture	10

Abstract

Hospital disaster resilience assessment is a process of analysing the condition of the site, building, people and operations through a checklist of indicators (i.e., structural, non-structural and functional). As in 2011, Global Platform on Disaster Risk Reduction has been established with twofold objectives: 1) by 2011, assessments on the safety of existing hospital facilities to be undertaken and 2) by 2015, action plans for hospitals should be developed and implemented in disaster prone countries. Howbeit the initiative was established, valid instruments for assessing resilience of existing hospital are lacking particularly in Malaysia. Hence, the objective of the paper is to evaluate the content validity of the disaster resilience hospital assessment instrument. Two methods were employed in the form of document analysis (7 instruments) and CVR & CVI questionnaire (6 experts). Based on the document analysis, 129 elements with three main constructs are suggested to be incorporated in the instrument. The CVR scores revealed that 48 out of 129 items are regarded as the utmost critical (structural - 2; non-structural - 7; and functional - 39). The findings for I-CVI and modified kappa coefficient however revealed that 122 items in the instrument are appropriate and excellent. The remaining seven items values are considered fair and poor and recommended to be eliminated. In addition, based on the S-CVI/Ave it is revealed that the content validity of the proposed instrument is adequate. As for this reason, it is noteworthy that the instrument to be highly regarded for evaluating the existing hospitals' resilience.

Keywords: Content validity index, content validity ratio, disaster, hospital disaster resilience assessment, modified Kappa coefficient

1.0 INTRODUCTION

A disaster resilient hospital is one which has the capability to resist, absorb, and respond to the shock of disasters while still retaining their most essential functionality (i.e., pre hospital care, emergency medical treatment, critical care, decontamination and isolation). As a result, the hospital could recover to its original state or a new adaptive state [1]. Likewise, safe and resilient hospitals are those that provide services efficiently, structurally strong, organised with contingency plans, and continue to function at maximum capacity during disasters [2]. Health facilities whether hospitals or rural health clinics, should be a source of strength during emergencies and disasters. Its infrastructure should be ready to save lives and to continue providing essential health services such as laboratories, medicines, treatment and rehabilitation. The purpose is to contribute to the community's sense of security and well-being which act as a symbol of hope during critical times [3]. In spite of its importance, health facilities are themselves vulnerable to disasters and can get damaged risking the lives of patients and health workers [2]. It is due to its complexity in terms of structural, non-structural and functional components; high level of occupancy and expensive equipment [4], [5].

It is proven in Malaysia that the impacts of various types of disasters (i.e. flood, fire, ceiling collapses, unhygienic hospital conditions, stolen equipment, and technical glitches) are affecting negatively towards public hospitals' resilience as shown in Table 1. This implies that, it is essential for the hospitals' stakeholders to assess the vulnerability of the facilities (i.e. structural; non-structural; and functional), in order to address the resilience competencies of those facilities [2], [6].

Table 1 Disasters affecting Public Hospitals in Malaysia

Disasters	Year	Affected Hospital	Condition
Flood	1995	Hospital Kuala Lumpur	Emergency department flooded
	2010	Hospital Kangar	Emergency department unable to function
		Hospital Alor Setar	Water supply shortage and risk of electric supply being cut
	2014	Hospital Raja Perempuan Zainab II	Hospitals flooded with water – accessibility, wards & equipment
		Kuala Krai Hospital	Breakdown in electricity, water & food supply
Fire	2009	Putrajaya Hospital	Roof was caught on fire – 3 wards have to be closed and equipment damaged
	2013 March	Sarawak General Hospital	Involving underground cables that cause malfunction to radiology equipment
	2013 May	Sarawak General Hospital	Short circuit in a humidifier placed in the gamma room (radioactive treatment & diagnosis for cancer patient)
	2014	Sungai Buloh Hospital	Damaging its Uninterrupted Power Supply unit and causing 12 out of 22 operating theatres to be temporarily shut down as a precaution, although only five operating theatres were affected & air-conditioning malfunctioned
		Kuala Lumpur Hospital	Short circuit from control room on the eight floor
		Sarawak General Hospital	150 patients from 10 wards at evacuated due to thick smoke & one fatalities
Ceiling Collapses	2011-2013	Serdang Hospital	7th time ceiling collapse: Jan, 2011 - Main lobby Jan, 2012 - Main lobby Aug, 2012 - Emergency department & four injured; 15 ceilings collapsed Sept, 2013 - Maternity ward Nov, 2013 - Neo-natal ICU Dec, 2013 - Emergency department Dec, 2013 - Staff quarters & five escaped injuries
	2012	Raja Permaisuri Bainun Hospital	20 ceiling boards fell at Dermatology clinic – unable to support the weight of PVC pipe containing telephone and ICT cables
Unhygienic Hospital Conditions	2014	Hospital Selayang, Hospital Sungai Buloh, Hospital Kajang, Hospital Rawang & Hospital Tengku Ampuan Rahimah	Bins were overflowing, toilets and wards were not cleaned The wards were in a deplorable state and the nauseating stench from the toilets was disgusting
Stolen Hospital Equipment	2011-2012	Hospital Kuala Lumpur & Penang Hospital	Nearly RM 1.5 million medicine, equipment stolen from public hospitals Hospital Kuala Lumpur (RM 1.21 million) & Penang Hospital (RM 240,000) 97 assets "lost"- air-conditioning compressors, syringe pumps, physiologic monitoring systems & pulse oxymeters
Technical Glitch	2014	Universiti Malaya Medical Centre	46,000 MRI and CT scans lost after system upgrade 10 years' worth of images were not copied properly - backup hard drive corrupted & technical glitch

Source: [7]–[11]

Hence, the objective of the paper is to develop and evaluate the content validity of hospital disaster resilience assessment using Content Validity Ratio (CVR), Content Validity Index (CVI) and modified Kappa coefficient. The purpose of using CVR, CVI and modified kappa coefficient respectively is to indicate the essentiality and relevance of all the items with regards to the developed instrument. In addition, the content adequacy of the instrument could also be proven.

2.0 RESEARCH METHODOLOGY

According to the research onion model, five elements have to be covered in developing a research strategy. The five elements constitutes of: research philosophy, approaches, strategies; time horizons and data collection methods [12]. Consequently, epistemology is defines as a branch of research philosophy, examines and contributes as a theory of knowledge by considering the nature and definition of knowledge as being truth within certain limitations. Meanwhile, ontology defines the nature of being, entities that can exist and their categories in groups, hierarchies, or divisions [13]. Positivist ontology and epistemology were engaged in the research which positivist researchers' emphasis on measurable data using highly standardised tools such as questionnaire [14].

Two (2) methods of data collection were employed in order to develop and evaluate the content validity of hospital disaster resilience assessment instrument. The first method is through document analysis of seven existing hospital assessment instruments. The purpose of document analysis is to develop hospital disaster resilience instrument in the form of questionnaire (i.e., CVR - 3 point scale; CVI - 4 point scale). Table 2 shows seven hospital assessment instruments that were used for the purpose of the study.

Table 2 Existing Hospital Assessment Instruments

Code	Instrument name	Source
I01	Health Facility Seismic Vulnerability Evaluation: A Handbook	[15]
I02	Field Manual for Capacity Assessment of Health Facilities in Responding to Emergencies	[16]
I03	Hospital Safety Index: Guide for Evaluators	[17]
I04	Hospitals Should be Safe from Disasters: Reduce Risk, Protect Health Facilities, Save Lives	[3]
I05	Safe Hospitals in Emergencies and Disasters: Structural, Non-Structural and Functional Indicators	[2]
I06	Hospital Safety from Disasters	[5]
I07	Hospital Disaster Preparedness Indicators	[18]

Subsequently, the second method is by means of CVR and CVI questionnaire survey. Both surveys are considered unique for quantitative method since the surveys could constitute small size of respondents. A minimum of five experts is recommended to have sufficient control over the chance agreement on the content validity. In addition, it is unlikely that more than ten people are used. It is due to the fact that as the number of experts increase, the probability of chance agreement decreases [19]–[21]. The content validity of the survey also could be attained through four members of experts [13].

Six respondents have been selected as content experts for the purpose of this research. Hence, it could be inferred that the numbers of experts involved in the research are acceptable. Table 3 provides information on the six (6) respondents that were selected as content experts. Based on the designation and professional background of the respondents, it is reasonable to deduce that the respondents have sound knowledge on the disaster resilience assessment instrument items.

Table 3 Respondents' Background

	Organisation	Designation	Background	Exp.
R1	Ministry of Health Malaysia	Government Security Officials	Health & Safety	30
R2	Government University	Academician	Health science	30
R3	Government University	Academician	Civil engineering	23
R4	Government University	Academician	Construction	30
R5	Government Hospital	Emergency physician	Emergency medicine	16
R6	MERCY Malaysia	Head of technical team	Architecture	10

The methodology used for this research is based on quantitative research technique through predetermined questionnaire distributed to panels of content experts. The findings of the questionnaire survey will be evaluated through Content Validity Ratio (CVR), Content Validity Index (CVI) and modified kappa coefficient (K*) which are discussed in turn:

2.1 Content Validity Ratio (CVR)

The content validity of a measuring instrument is the degree to which the content of the items adequately represents the universe of all relevant items under study. The content validity could be employed by means of judgmental method and panel evaluation with content validity ratio (CVR) [22]. The content validity ratio (CVR) method represents as proportional level of experts' agreement in rating an item as essential. In addition it recommends a 3-point scale to rate each item; (1) not necessary; (2) useful but not essential; and (3) essential.

The value of CVR is calculated using a formula of CVR= [ne - (N/2)]/ (N/2)]. The ne value is implied as the number of panel members indicating an item essential and N is the number of panel members [23]. In order to evaluate the item as very important, the value of CVR will be compared to CVR critical table that has been revised by Ayre & Scally in 2014 [24].

2.2 Content Validity Index (CVI)

In contrast, another approach is the content validity index (CVI), which can be used to rate each instrument item in terms of its relevancy to the construct on a 4-point scale; (1) irrelevant; (2) somewhat relevant; (3) relevant; and (4) extremely relevant. There are two quantitative approaches for estimating content validity index (CVI): item level content validity index [I-CVIs]; and scale level content validity index [S-CVIs] [25]. CVI for relevancy of each item (item levels [I-CVIs] are computed as the number of experts giving a rating 3 or 4 to the relevancy of each item, divided by the total number of experts [21], [25]. Compared with I-CVIs, S-CVIs are the proportion of total items on an instrument that achieve a rating 3 or 4 by the content experts [25].

2.3 Modified Kappa coefficient

Although CVI is extensively used to estimate content validity by researchers, this index does not consider the possibility of inflated values because of the chance agreement. Therefore, CVI and Kappa coefficient could provide quantifiable methods [Pc= [N! /A! (N-A)!]*0.5^N; K*= (I-CVI-Pc)/ (1-Pc)] for evaluating the level of agreement between content experts [21].

3.0 RESULTS ON DOCUMENT ANALYSIS

3.1 Development of Hospital Disaster Resilience Assessment Instrument

An assessment for resilience hospital is a process of analysing the condition of a site, building, people and operations once exposed to a natural hazard. The assessment comprises of structural, non-structural and functional elements for hospital's structures [2], [3], [5], [15]–[18], [26]. Structural assessment determines the overall safety of the building structure (i.e., foundations, columns, beams, slabs, load-bearing walls, braces and trusses); construction materials and previous exposure to natural or other hazards [3], [17], [18]. On the contrary, the non-structural assessment evaluates the safety of architectural elements, equipment, contents and services or lifelines [3], [18]. In the case of hospitals, nearly 80% of the total cost of the facility is made up of non-structural elements [3]. Apart from that, functional assessment evaluates hospital's capacity to function during and after disaster in terms of: hospital management; implementation of disaster plans; resources; and training [17].

Hence, it can be deduced that hospital disaster resilience assessment is a process of analysing the condition of the site, building, people and operations through a checklist of indicators to assess structural, non-structural and functional elements of the hospital structures. Table 4 shows the details of the seven existing hospital assessment instruments to disasters that were used in relation to the purpose of study. The measures in the evaluation instrument were designated in the forms of questionnaires or checklists.

Table 4 Details of Existing Hospital Assessment Instruments to disasters

Instrument code	Type of instrument	Scaling	Dimensions (measures)	Disaster type	Validity
I01	Questionnaire	Low / Moderate / High; Poor / Average / Good; Regular / Backup	3 (45)	Earthquake	Not tested
I02	Questionnaire	Yes/No; Multiple-choice items	Part I: 4 (99) Part II: 4 (99) Part III: 3 (84)	All-hazards	Not tested
I03	Questionnaire	Low/ Average/ High	4 (143)	All-hazards	Not tested
I04	Checklist	Yes/No	3 (196)	All-hazards	Not tested
I05	Checklist	Yes/No	3 (69)	All-hazards	Not tested
I06	Questionnaire	Not safe/ Average/ High	3 (145)	All-hazards	Face validity
I07	Questionnaire	Poor/ Fair/ Good/ Very good/ Excellent	8 (33)	All-hazards	Not tested

Source: [2], [3], [5], [15]–[18]

Based on the details of the existing hospital assessment instruments, the common limitations of these instruments are lack of validity. Most of the instruments validity (n=6) were not tested despite the fact that in instrument development, content validity is a critical step [27]. Nonetheless, one of the instruments has tested its validity in the means of face validity. However, face validity is a subjective assessment and it implies that it is the weakest form of validity [28]. Face validity concerns judgments about items after an instrument is constructed, whereas content validity is more properly ensured by the plan of content and item generation before constructed. Thus, face validity could be considered as one limited aspect of content validity [21]. Hence, measuring and reporting on the content validity of hospital disaster resilience assessment instrument is the essence of the study.

Table 5 presents the components of each constructs (i.e., structural; non-structural; and functional) along with number of items. The disaster resilience assessment instrument comprises of 129 elements with three main constructs (i.e., 5 structural items -22 elements; 5 non-structural items - 43 elements; and 10 functional items - 64 elements) which have been extracted from the existing assessment instruments mentioned earlier. Hence, it could be deduced that the developed items from document analysis act as input factors for further data collection through questionnaire of hospital disaster resilience assessment instrument by various content experts.

Table 5 Components of Hospital Disaster Resilience Assessment Instruments

Constructs	Items	Ele.
Structural	Design	7
	Structures	7
	Construction materials	2
	Prior events affecting hospital safety	3
	Permit and clearance	3
Non Structural	Existence of Building documents/ drawings / plans	4
	Architectural elements	12
	Lifeline system	9
	Medical and Laboratory equipment used for Diagnostic and Treatment	10
	Equipment and furnishing	8
Functional	Site and accessibility	7
	Internal circulation and interoperability	4
	Logistic system for availability of basic equipment and supplies	5
	Hospital emergency management standard operating procedures (SOP)	13
	Hospital Emergency Management Guidelines	7
	Operational Plan for Internal and External disaster	8
	Hospital systems - Building Related	4
	Hospital systems - Function related	5
	Human resources	6
	Monitoring and evaluation	5
Total		**129**

4.0 RESULTS ON CVR & CVI QUESTIONNAIRE

The key findings from the questionnaire will be presented in terms of Content Validity Ratio (CVR), Content Validity Index (CVI) and modified kappa coefficient (K*). The detailed results are listed in turn:

4.1 Content Validity Ratio (CVR)

Table 6 shows 48 out of 129 items have been addressed by the content experts as utmost critical item: structural - 2 items; non-structural - 7 items; and functional - 39 items. Based on CVR critical table, the item score CVRcrit=1.000 for six number of experts (N=6) will be classified as critical [24].

Table 6 CVR critical items in Hospital Disaster Resilience Assessment Instrument

Item no.	Items
STRUCTURAL	
ST07	Presence of ramps for moving bed patients and for use by people with disabilities
ST15	Built with fire-resistive and non-toxic materials
NON-STRUCTURAL	
NT18	Condition and safety of telecommunication system and alternative backup
NT20	Condition and safety of medical gas system
NT21	Condition and safety of fuel storage and alternative backup
NT22	Condition and safety of fire suppression system
NT23	Emergency exit system
NT37	Anchor bolts in the walls in appropriate locations so that the equipment can be removed and fixed in a safe place when not in use
NT38	Supplies in laboratory, pharmacy, general stores properly secured on shelves and in racks
FUNCTIONAL	
FT01	Readily accessible to community
FT02	Condition of hospital access routes
FT03	Reasonably free from environmental hazards (undue noise, smoke, dust, foul odours, floods)
FT05	Emergency exit system (directional signage)
FT06	Condition of internal emergency access routes (ramps, corridors, hallway, stairway)
FT08	Nurses at stations are accessible to patients
FT10	Proper zoning of service areas (OPD, ER, admin., primary health care, radiology, laboratory)
FT11	Secured and controlled points of entry
FT12	Presence of emergency medicines in emergency room/critical area
FT13	Presence of medical instruments and supplies for emergency procedures (medical gases, ventilators, life support equipment)
FT14	Inventory management for medical and surgical instrument
FT15	Inventory management for drugs requirement (storing, stocking, usage control)
FT16	Special arrangement for emergency procurement of medicine supplies and equipment during disaster
FT17	SOP for Internal and External Referral and counter-referral of patients
FT18	SOP for Emergency Response
FT19	SOP for Admission to Emergency Department
FT20	SOP for Collecting and analysing information
FT21	SOP for Special administrative for disasters and emergency response
FT26	Preparing sites for temporary placement of dead bodies and for forensic medicine
FT28	SOP for Response during evening, weekend, and holiday shifts
FT30	Guidelines for food and supplies rations of hospital staff during emergencies
FT31	Duties assigned for additional personnel mobilized during the emergency
FT32	Measures to ensure well-being of additional personnel mobilized
FT33	Mental health and psycho-social treatment for patients, families, and health workers
FT37	Hospital emergency preparedness plan
FT38	Hospital emergency response plan
FT39	Hospital emergency recovery plan
FT40	Hazard prevention and mitigation plan

Item no.	Items
FT41	Vulnerability reduction plan
FT42	Capacity Development Plan
FT44	Manual of Operation, Preventive Maintenance, and Restoration of Critical Services
FT45	Presence of safe potable and alternate source water in emergencies
FT46	Presence of emergency power generator or alternative power for emergency lighting and operation of essential equipment
FT47	Presence of medical gasoline or its alternative for emergency
FT48	Active and passive fire protection system
FT49	Hospital safety and security system
FT54	Hospital emergency operations centre (EOC)
FT57	Emergency room medical staff trained in Advanced Cardiac Life Support
FT58	Emergency room medical staff trained in Advanced Paediatric Cardiac Life Support

To recapitulate, these 48 items (indicated in Table 6) have been confirmed by all the respondents as critical to be incorporated in the hospital disaster resilience assessment instrument (i.e. structural; non-structural; and functional). However the remaining 81items will be retained for further CVI and modified kappa coefficient testing.

4.2 Content Validity Index (CVI) and Modified Kappa Coefficient

It is proposes that if the I-CVI is higher than 0.790 the item will be appropriate. If it is between 0.700-0.790 the items will be considered needs revision and items with less than 0.700 will be eliminated [29]. Based on the I-CVI scores, 122 items ranged from 0.833 to 1.000 are classified as appropriate to be incorporated in the hospital disaster resilience assessment instrument. However, the value of remaining seven items (ST04, ST05, ST10, NT02, NT11, NT12, and NT14) are below than 0.700. Hence, it is reasonable to infer that the remaining seven items should be eliminated from the hospital disaster resilience assessment instrument. Apart from determining the elimination of the items using I-CVI, all the items as well have been evaluated based on modified kappa coefficient scores. It is suggested that an item with K* less than 0.40 means poor, 0.40-0.59 means fair, 0.60-0.74 means good, and greater than 0.74 means excellent [30].

The findings revealed that 122 items are excellent and the remaining seven items are considered fair and poor (5-fair and 2- poor) which is in-line with previous I-CVI findings. Thus, it is recommended that those seven items should be eliminated. It is believed that the content experts perceived those 7 items as irrelevant for the instrument and the 122 items are otherwise.

Table 7 shows the calculation of content validity for hospital disaster resilience assessment instrument by means of S-CVI/Ave (before and after modification).

Table 7 Content validity of hospital disaster resilience assessment instrument (before & after modification)

Before modification (129 items)			After modification (122 items)		
I-CVI classification	No. of items	Total score of I-CVI	I-CVI classification	No. of items	Total score of I-CVI
> 0.79	122	115.167	> 0.79	122	115.167
0.70 - 0.79	-	-	0.70 - 0.79	-	-
< 0.70	7	4.333	< 0.70	-	-
Total		119.500	Total		115.167
S-CVI/Ave		0.926	S-CVI/Ave		0.944

*I-CVI= item-level-CVI; S-CVI= scale-level-index

It is recommended that S-CVI/Ave score greater than 0.900 for an instrument is considered to have adequate content validity [31]. During early stage, it is suggested that 129 items should be considered for the hospital disaster resilience assessment instrument and it is revealed that the S-CVI/Ave score is 0.926. Hence, it implies that hospital disaster resilience assessment instrument has adequate content validity. However, based on the previous findings (I-CVI and modified kappa coefficient), seven items are suggested to be eliminated from the instrument. Thus, after modification (122 items), it is revealed that S-CVI/Ave score is 0.944 which is proved to be more adequate.

Hence, the table indicates that by incorporating those 122 items, the hospital disaster resilience assessment instrument is believed to have adequate content validity which represents the main construct (i.e. structural, non-structural and functional). It could be synthesised with Markus's BPRU model which comprises of four themes (i.e. building, environment, activity and objective) [32] as shown in Table 8. The BPRU model indicates that the four systems are equally important in delivering the organisational goals such as hospital service delivery and ensuring their facility resilience to extreme weather events.

Table 8 Markus BPRU Model

Themes	Variables
Building	Building, window, fire alarm, lifts, stairs, roof access, door, room, façade, structure/structural damage, water, power/electricity, generator, light, air conditioning, phone line/telecomm, sewerage, equipment
Environment	Corridor, ventilation, heat, cold, humidity, lighting, air quality, temperature, air flow, smoke, infection control
Activity	Training, drill, staff, evacuation, transport, maintenance, repair communication, retrofit
Objective	Plan/planning, debriefing, service continuity, business continuity, preparedness, patient treatment, emergency supplies

Source:[31]

In addition, it in-line with Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030 by which the resilience of national health systems should be enhanced, through integrating disaster risk management into primary, secondary and tertiary health care; developing the capacity of health workers in understanding disaster risk; implementing DRR approaches in health work; enhancing training capacities in the field of disaster medicine; and training community health groups in DRR approaches in health programmes [32].

5.0 CONCLUSION

This paper has presented the findings on content validity of the disaster resilience hospital assessment instrument by means of document analysis and questionnaire (i.e. Content Validity Ratio (CVR); Content Validity Index (CVI); and modified Kappa coefficient). Based on the document analysis, 129 elements with three main constructs (i.e. structural -22 elements; non-structural - 43 elements; and functional - 64 elements) are suggested to be incorporated in the disaster resilience assessment instrument.

The CVR scores revealed that 48 out of 129 items are regarded as the utmost critical by the content experts. These are: structural - 2 items; non-structural - 7 items; and functional - 39 items. Nevertheless, the remaining 81 items will be retained for further I-CVI and modified kappa coefficient testing.

The findings for I-CVI and modified kappa coefficient however revealed that 122 items in hospital disaster resilience assessment instrument are appropriate and excellent. The remaining seven items values are considered fair and poor (2- poor and 5-fair) and recommended to be eliminated.

In addition, based on the S-CVI/Ave it is revealed that the content validity of the instrument is adequate. As for this reason, it is noteworthy that the hospital disaster resilience assessment instrument to be highly regarded for evaluating the hospitals resilience level. The instrument is highly reliable and the items selected are the most appropriate for the construct (i.e., structural; non-structural; and functional).

Therefore, the paper makes an original contribution to the broader area of hospital disaster management. Moreover, it is recommended that the items particularly the structural and non-structural could serve as a guideline for risk reduction in the design and construction of new health facilities.

The method and approach adopted undoubtedly is a systematic, subjective and two-stage process. In the first stage, the process of instrument development was carried out, followed by judgmental method and panel evaluation of the instrument items. It is acknowledged that the process is extensively more accurate approach in critiquing the research instrument. Hence, the research serves as a reference for academic researchers in preparing a valid assessment instrument. The work introduced in this paper can form a sound basis for future studies.

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