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Validation of the Malay Version Questionnaire for Industrial Preparedness of Infectious Disease

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Abstract
The COVID-19 outbreak calls for a comprehensive guideline to control virus transmission. Hence, the Department of Occupational Safety and Health (DOSH) Malaysia has developed workplace guidelines which include a questionnaire as an instrument to measure the industrial preparedness in managing the disease. In this study, a bilingual questionnaire was developed and validated in Malay and English, as Malaysia is comprised of multi-cultural and multi-lingual respondents. Content Validity Index and Face Validity Index was conducted to validate the questionnaire which involved ten experts. Results provide evidence of high validity and reliability, with Cronbach's alpha value ranging from 0.79 to 0.97.

Keywords: COVID-19; Occupation; Safety; Questionnaire Validation

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1.0 Introduction

The Coronavirus Disease 2019 (COVID-19) pandemic has impacted the operations and worker's health in global industries (Pamidimukkala & Kermanshachi, 2021). The high rate of virus transmission was alarming, hence it is crucial to address the importance of industrial preparedness for the disease and the requirement for workplace safety measures in Malaysia (Yadegaridehkordi et al., 2023). Hence, the Department of Occupational Safety and Health (DOSH) developed a standardized protocol for the industries to manage the transmission of COVID-19 (National Institute of Occupational Safety and Health Malaysia, 2021). However, the effectiveness of the protocols is influenced by the workers' comprehension and adherence to the guidelines.

Therefore, a validated and reliable tool is necessary to obtain an accurate assessment of workplace preparedness and adherence to the guidelines. In Malaysia, bilingual questionnaires are needed to ensure proper data collection for respondents of different cultural backgrounds (Goh et al., 2020). However, it is difficult to obtain accurate results due to limited validated questionnaires in Malaysia,

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especially on COVID-19 workplace preparedness and adherence to the guidelines (Kunyahamu et al., 2023). Thus, validation of the questionnaire is urgently needed to ensure that the instrument can effectively measure the context, improving the reliability and validity of the findings.

The evaluation of the questionnaire involved two commonly used tests, which are the Content Validity Index (CVI) and Face Validity Index (FVI) (Dalawi et al., 2023). These steps are crucial in cross-cultural research, where language and cultural differences play an important role in influencing the respondents' comprehension (Romli et al., 2022). There were previous studies that have validated various occupational health questionnaires, but there is limited literature on instruments to measure the industrial preparedness for COVID-19 in the local context.

Hence, this study aims to verify the Malay version of a questionnaire designed to measure the industrial preparedness for COVID-19. The objective of this study is to determine the CVI and FVI values, contributing to improved workplace safety management and preparedness in Malaysia.

2.0 Literature Review

The outbreak of COVID-19 emphasized the importance of industrial preparedness in controlling infectious diseases in order to minimize or reduce transmission (Maccaro et al., 2023). Hence, a comprehensive guideline is required to ensure effective preparedness during the COVID-19 disease outbreak. Unfortunately, most countries including Malaysia, lacked of standardized protocols during the early stages of the pandemic, causing varied responses across industries (Aziz et al., 2020). The lack of standardized protocols calls for the development of clear guidelines and effective communication for the industries.

Globally, general frameworks for workplace safety during the pandemic were developed by the World Health Organization (WHO) and the International Labour Organization (ILO) (International Labour Organization, 2020). In Malaysia, the Department of Occupational Safety and Health (DOSH) implemented targeted guidelines to control the disease outbreak including COVID-19 in industries (Shafii et al., 2022). The guidelines focused on risk assessments, hygiene practices, social distancing and employee health monitoring (Shafii et al., 2022). However, in order to ensure effective implementation, the employees need to understand well the context. Thus, this highlights the need for culturally relevant communication tools, which include a bilingual questionnaire.

In order to ensure accurate measurements of the context, a questionnaire needs to be validated. Language barriers can influence the respondents' understanding in cross-cultural research thus casing the reliability and validity of the data collected (Tsang et al., 2017). Hence, questionnaires must be tailored according to the local language and culture, where English and Malay are commonly used in Malaysia. The aim of this study is to validate the Malay version of a questionnaire in assessing industrial preparedness for infectious diseases to ensure accurate responses from Malay-speaking respondents.

The Content Validity Index (CVI) and Face Validity Index (FVI) are commonly used approaches to validate questionnaires (Yusoff, 2019). CVI determines the clarity of the items to ensure the content would represent the outcome of the questionnaire (Polit & Beck, 2006). The Face Validity Index (FVI) assesses the understandability of the questionnaire from the respondents' perspective (Dalawi et al., 2023). Previous studies have also validated questionnaires to assess occupational health and safety in different cultural contexts. For example, Bujang and colleagues (2017) validated a Malay version of a Diabetes Quality of Life (DQOL) questionnaire for the Malaysian adult population with type 2 diabetes mellitus (DM). In addition, Ching and colleagues (2015) demonstrated the effectiveness of bilingual questionnaires in psychometric properties of the Smart Phone Addiction Scale (SAS). These research focuses the need of validating instruments to maintain the integrity of the data.

Although previous research has validated multiple occupational health questionnaires, there is still gaps on assessing industrial preparedness for COVID-19 in Malaysia. Moreover, there has only few researches used the CVI and FVI method to validate bilingual process. The study highlights the limit by validating the Malay version of questionnaire, to provide an accurate tool for assessing industrial preparedness, contributing to better management of infectious disease in the workplace.

3.0 Methodology

Content validity refers to the extent to which the questionnaire items represent the entire domain in the tests that need to be measured. The method seeks to assess the quality of the items on a test. Face validity refers to the degree to which test respondents view the content of a test and its items as relevant to the context in which the test is being administered (Yusoff, 2019). Then, the pilot study was conducted before the actual research.

3.1 Study Design and Sampling Method

This study is a validation study and aims to assess the validity of the Malay version of the instrument of Industrial Preparedness for Infectious Diseases in the Malaysian Workplace. The sampling method used is non-probability sampling, which is convenience sampling.

3.2 Participants

For Content Validity Index (CVI), there were 7 experts from Universiti Teknologi MARA (UiTM) and the Department of Occupational Health and Safety (DOSH) from various expertise which are Environmental Health Lecturers (Expert 1 and Expert 3), Epidemiology and Biostatistics Lecturer (Expert 2), Occupational Health Lecturers (Expert 4 and Expert 6), Occupational Health Director (Expert 5) and Occupational Health Vice Director (Expert 7).

For Face Validity Index (FVI), 10 experts participated in this study. The experts came from various expertise in Universiti Teknologi MARA (UiTM), which are Sports Science and Recreation Officer (Expert 1), Librarian (Expert 2), Senior Dormitory Manager (Expert 3), Engineer (Expert 10), Engineer Assistants (Expert 4 and Expert 5). Architect (Expert 6), Senior Security Officer (Expert 7), Science Officer (Expert 8) and Nurse (Expert 9).

The pilot study was conducted among a group of Universiti Teknologi MARA (UiTM) staff from the Safety and Occupational Health Committee (OSHCo) 2021 – 2023 based on the inclusion and exclusion criteria. The researchers shortlisted a few potential participants from various areas of faculty and positions. A total of 10 participants, including the secretary for OSHCo, were chosen using a convenience sampling method. The selected participants must complete and distribute the forms to any three people among the same faculty.

3.3 Ethical Approval

This study obtained ethical approval from the Universiti Teknologi MARA (UiTM) Committee. For participants of this validation study, the experts were contacted, and consent forms were e-mailed to them before they assessed the instrument.

3.4 Instruments

The validation form was conducted using a non-face-to-face approach and was constructed using Google Forms in Malay and English. This instrument was the questionnaire that have been translated by forward and backward translation. The translators for the questionnaire are from English to Malay, and the researcher's translation team comprises four language experts.

This instrument consists of sociodemographic sections and Industrial Preparedness for Infectious Diseases in the Workplace in Malaysia. The form, objectives, theoretical framework, and definition of variables in the domain were distributed to the experts via e-mail and WhatsApp.

The instructions were also included in the Google Form for every domain of the questionnaires to give the experts a better view and more precise understanding of how to review the validity. The researcher put extra protection on the form to ensure the confidentiality of the domain. Experts need to fill in their official e-mails to access the questions.

3.5 Validity

3.5.1 Content Validity Index

The expert panels were invited to judge each domain in the questionnaires using the Content Validity Index (CVI) (Zamanzadeh et al., 2015). The experts were asked to review the domain and give the score on each item in terms of its relevance with a 4-Likert scale: 1 = the item is not relevant to the measured domain; 2 = the item is somewhat relevant to the measured domain; 3 = the item is quite relevant to the measured domain, and 4 = the item is highly relevant to the measured domain.

The experts also need to provide written comments and suggestions, if there are any, to help improve the relevance of the items. All comments are being considered to fine-tune the domain and items. The proportion of content experts giving items a relevance score of 3 or 4 is used to calculate the item-level content validity index (I-CVI).

To obtain the CVI for each item (I-CVI), the number of experts that gave scores of 3 and 4 was divided by the number of the whole content expert panels. The scale-level CVI (S-CVI) was calculated by averaging the I-CVI of all the items. S-CVI of 0.8 or higher is acceptable (Polit & Beck, 2006). After fine-tuning by the research team and expert panels, both questionnaires are ready for face validity.

3.5.2 Face Validity Index

The experts were asked to review the domain and give the score on each item in terms of its clarity and comprehension with a 4-Likert scale: 1 = the item is not clear and understandable; 2 = the item is somewhat straightforward and understandable; 3 = the item is clear and understandable, and 4 = the item is apparent and understandable.

The experts also need to provide written comments and suggestions, if there are any, to help improve the clarity of the items. All comments are being considered to fine-tune the domain and items. The proportion of content experts giving items a clarity score of 3 or 4 is used to calculate the item-level face validity index (I-FVI). The experts were also asked to write their comments if there were any recommendations to improve the tools. The research team discussed back the results from the feedback for further fine-tuning of each item.

4.0 Findings and Discussion

4.1 Sociodemographic of Participants

Table 1 shows the sociodemographic of participants for the Content Validity Index (CVI). In total, there were seven experts: 5 experts were from Universiti Teknologi MARA (UiTM) and the remaining two from the Department of Occupational Safety and Health (DOSH) participated in this study. There were 3 (42.9%) female experts and 4 (57.1%) male experts. 1 (14.3%) of the experts have a degree, while 3 (42.9%) hold a Master's and PhD. Most of the experts are lecturers. 4 (57.1%) of the experts were experts in occupational safety and health, 2 (28.6%) were experts in environmental health, and 1 (14.3%) were experts in the fields of epidemiology and biostatistics.

Table 1. Sociodemographic of Participants for Content Validity Index (CVI)

Participants Characteristics	N (%)
Gender	
Female	3 (42.9)
Male	4 (57.1)
Education Level	
Degree	1 (14.3)
Master	3 (42.9)
PhD	3 (42.9)
Occupation	
Lecturer	5 (71.4)
Director	1 (14.3)
Vice-Director	1 (14.3)
Expertise	
Environmental Health	2 (28.6)
Epidemiology and Biostatistics	1 (14.3)
Occupational Safety and Health	4 (57.1)

Table 2 shows the sociodemographic of participants for the Face Validity Index (FVI). A total of 10 experts from Universiti Teknologi MARA (UiTM) participated in this study. There were 3 (30%) female experts and 7 (70%) male experts. One (10%) of the experts possess a diploma, while 6 (60%) hold a degree and 3 (30%) have a Master's degree. Most of the experts were officers.

Table 2. Sociodemographic of Participants for Face Validity Index (FVI)

Participants Characteristics	N (%)
Gender	
Female	3 (30)
Male	7 (70)
Education Level	
Diploma	1 (10)
Degree	6 (60)
Master	3 (30)
Occupation	
Officer	3 (30)
Librarian	1 (10)
Assistant	2 (20)
Architect	1 (10)
Nurse	1 (10)
Engineer	1 (10)
Expertise	
Sports Science and Recreation	1 (10)
Library Management	1 (10)
Administration	1 (10)
Building Construction	1 (10)
Civil Engineering	1 (10)
Architecture	1 (10)
Safety	1 (10)
Science	1 (10)
Nursing	1 (10)
Mechanical Engineering	1 (10)

Table 3 shows the sociodemographic characteristics of a pilot study. A total of 30 respondents have taken part in this study. 9 (30%) of the respondents were females, while 21 (70%) were males. 10 (33.3%) of the respondents have a certificate, 9 (30%) with a diploma, 10 (33.3%) possess a degree and 1 (3.3%) with a Master. Most of the participants work as assistants in their departments.

Table 3. Sociodemographic of Pilot Study

Participants Characteristics	N (%)
Gender	
Female	9 (30)
Male	21 (70)
Education Level	
Certificate	10 (33.3)
Diploma	9 (30)
Degree	10 (33.3)
Master	1 (3.3)

Occupation	
Lecturer	4 (13.3)
Officer	8 (26.7)
Assistant	9 (30)
Technologist	5 (16.7)
Clerk	4 (13.3)

4.2 Content Validity Index

A total of seven experts were involved in this study. The distribution of I-CVI in each item is displayed at the Appendix section. Most of the items have I-CVI of 1. The lowest I-CVI was 0.71 (Item A3.3, 8.12 and 8.13).

Table 4 shows the proportion relevance for each expert. The lowest proportion of relevance was expert 6 and 7, with 0.95. The scale-level content validity index based on the average method (S-CVI/Ave) was 0.98 and the scale-level content validity based on the universal agreement method (S-CVI/UA) was 0.87.

Table 4. I-CVI Value for All Questions by Experts

Experts	Proportion relevance
Expert 1	0.98
Expert 2	0.97
Expert 3	1
Expert 4	1
Expert 5	1
Expert 6	0.95
Expert 7	0.95
Scale S-CVI/Ave	0.98
Scale S-CVI/UA	0.87

Table 5. Summary of Content Validity

No.	Domain	No. of Items	I-CVI (>= 0.83)	S-CVI/Ave (>=0.90)	S-CVI/UA
1	Management Support	6	1	1	1
2	Organisational Measures	13	0.98	0.98	0.85
3	Indoor Air Quality	4	0.89	0.89	0.5
4	Policy on Infectious Diseases	15	1	1	1
5	Expertise related to Human Resources and Occupational Safety and Health (OSH)	7	1	1	1
6	Post-Recovery Programme	5	1	1	1
7	Creating Awareness	8	0.98	0.98	0.88
8	Risk Communications (Engineering Control)	16	0.95	0.95	0.75
9	Risk Communications (Administrative Control)	10	0.97	0.97	0.8
10	Cleaning and Disinfection	8	0.98	0.98	0.88
11	Hand Hygiene	6	0.98	0.98	0.83
12	Business Communication	4	1	1	1
13	Knowledge, Practice and Culture of Occupational Safety and Health (OSH)	12	0.99	0.99	0.92
14	Risk Behaviour (Personal Protective Equipment or PPE) Compliance	14	0.97	0.97	0.77
15	Workplace Readiness	102	0.98	0.98	0.87
16	Disease Profile, Individual Control Factors	26	0.98	0.98	0.85
17	ALL ITEMS	128	0.98	0.98	0.87

Table 5 shows the overall I-CVI, S-CVI/Ave and S-CVI/UA for each domain. For all items, the I-CVI was 0.978, S-CVI/Ave was 0.98 and the S-CVI/UA was 0.87. The domain Indoor Air Quality was found to be the lowest I-CVI (0.89), A-CVI/Ave (0.89) and S-CVI/UA (0.50).

4.3 Face Validity Index

A total of 10 respondents were involved in this study. The distribution of I-CVI in each item is displayed Appendix. Most of the items have I-CVI of 1. The lowest I-CVI was 0.20 (Item A3.3).

Table 6 shows the proportion of clarity and comprehension for each respondent. The lowest proportion clarity and comprehension was for respondent 5 with 0.56. The scale-level content validity index based on the average method (S-CVI/Ave) was 0.85 and the scale-level content validity based on the universal agreement method (S-CVI/UA) was 0.328.

Table 6. I-FVI value for all questions by respondents

Expert	Proportion clarity and comprehension
Expert 1	0.83
Expert 2	0.82
Expert 3	0.94
Expert 4	1
Expert 5	0.56

Expert 6	0.67
Expert 7	0.78
Expert 8	0.9
Expert 9	1
Expert 10	0.97
Scale S-FVI/Ave	0.85
Scale S-FVI/UA	0.33

Table 7 shows the overall I-CVI, S-CVI/Ave and S-CVI/UA for each domain. For all items, the I-CVI was 0.85, the S-CVI/Ave was 0.85 and the S-CVI/UA was 0.33. The domain Indoor Air Quality was found to be the lowest in I-CVI (0.38) and A-CVI/Ave (0.38). For S-CVI/UA, there were two domains with a score 0 (indoor air quality and business communication).

Table 7. Summary of Face Validity Index

No.	Domain	No. of Items	I-FVI (>= 0.83)	S-FVI/Ave (>=0.90)	S-FVI/UA
1	Management Support	6	0.92	0.92	0.33
2	Organisational Measures	13	0.84	0.84	0.15
3	Indoor Air Quality	4	0.38	0.38	0
4	Policy on Infectious Diseases	15	0.9	0.9	0.33
5	Expertise related to Human Resources and Occupational Safety and Health (OSH)	7	0.86	0.86	0.29
6	Post-Recovery Programme	5	0.92	0.92	0.6
7	Creating Awareness	8	0.91	0.91	0.63
8	Risk Communications (Engineering Control)	16	0.85	0.85	0.31
9	Risk Communications (Administrative Control)	8	0.95	0.95	0.63
10	Cleaning and Disinfection	8	0.96	0.96	0.71
11	Hand Hygiene	6	0.9	0.9	0.5
12	Business Communication	4	0.85	0.85	0
13	Knowledge, Practice and Culture of Occupational Safety and Health (OSH)	12	0.88	0.88	0.25
14	Risk Behaviour (Personal Protective Equipment (PPE) Compliance	14	0.7	0.7	0.07
15	Workplace Readiness	99	0.87	0.87	0.37
16	Disease Profile, Individual Control Factors	26	0.78	0.78	0.15
17	ALL ITEMS	128	0.85	0.85	0.35

4.4 Pilot Study

Among the 30 participants' preliminary data, the researcher assessed the feasibility of the small study before proceeding to the actual full-scale survey. Various aspects have been evaluated to determine the resource requirements and identify potential logistical problems. There are multiple purposes for conducting it, including developing and testing the research tool's adequacy, assessing the full-scale study's feasibility, collecting preliminary data, determining resource requirements and identifying logistical problems that might occur.

Cronbach's alpha value was produced to analyse whether the questionnaire was valid. The tools have been deemed reliable, with an overall alpha value of 0.98. Each domain also had alpha values that ranged from 0.79 to 0.97. Table 8 shows the summary of the Cronbach's alpha values.

Table 8. Summary of the Cronbach's Alpha Values

No.	Domain	Cronbach's alpha values	Number of domains	Result
1	Management Support	0.81	6	Acceptable
2	Organisational Measures	0.88	13	Acceptable
3	Indoor Air Quality	0.95	4	Acceptable
4	Policy on Infectious Diseases	0.93	15	Acceptable
5	Expertise related to Human Resources and Occupational Safety and Health (OSH)	0.92	7	Acceptable
6	Post-Recovery Programme	0.96	5	Acceptable
7	Creating Awareness	0.95	8	Acceptable
8	Risk Communications (Engineering Control)	0.91	16	Acceptable
9	Risk Communications (Administrative Control)	0.93	8	Acceptable
10	Cleaning and Disinfection	0.93	7	Acceptable
11	Hand Hygiene	0.91	6	Acceptable
12	Business Communication	0.79	4	Acceptable
13	Knowledge, Practice and Culture of Occupational Safety and Health (OSH)	0.92	12	Acceptable

14	Risk Behaviour (Personal Protective Equipment (PPE) Compliance	0.97	14	Acceptable
15	Workplace Readiness	0.97	99	Acceptable
16	Disease Profile, Individual Control Factors	0.96	26	Acceptable
17	ALL ITEMS	0.98	125	Acceptable

5.0 Discussion

The study developed and demonstrated the validation of the Malay version questionnaire on industrial preparedness for infectious disease, focusing on the COVID-19. The assessment provides a reliable evidence in evaluating industrial preparedness. Our results show valid items with acceptable and reliable content. Results also show that items from domain risk communications (administrative control), number 9.8 and 9.9 were not relevant and discarded from the study.

The questionnaire consists of 16 domains, which contain management support, organisational measures, indoor air quality, policy on infectious disease, expertise related to Human Resources and Occupational Safety and Health (OSH), post-recovery programme, creating awareness, risk communications, cleaning and disinfection, hand hygiene, business communication, knowledge, practice and culture of occupational safety and health (OSH), risk behaviour compliance, workplace readiness and disease profile factors. Items with low universal agreement and S--CVI/UA agreement remained, as they were relevant based on literature reviews and expert recommendations.

6.0 Conclusion, Limitation and Recommendation

In summary, questionnaires to respondents about the industrial preparedness of infectious diseases have gone through a rigorous process to ensure that all the collected data are valid. The questionnaires were prepared in English earlier, then translated into Malay, and backward translation was done. Thus, respondents could choose their preferred language and compare as well; if the terms used are unclear, either the Malay or English version is better. Based on the study, the validation of the Malay version of the questionnaire was a success. It could be understood in terms of readability and comprehension by looking at the result of the pilot study, whereby 125 domains of Cronbach's alpha values of 0.98 are at the rate of Acceptable. While the questionnaire showed strong readability and comprehension, the study had several limitations, including a limited sample size and lack of industry diversity, which restrict the generalizability of the findings. Despite rigorous translation efforts, subtle differences in interpretation between the English and Malay versions may have influenced response consistency, and the reliance on self-reported data introduces potential bias.

Future research should involve a larger and more diverse sample across various industries to improve the generalizability of the findings. Additional studies are also needed to assess other psychometric properties of the questionnaire, such as construct validity, criterion validity, and test-retest reliability. Exploring cultural and linguistic nuances, as well as incorporating longitudinal and qualitative approaches, could further enhance the tool's accuracy and relevance in assessing industrial preparedness for infectious diseases.

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Paper Contribution to Related Field of Study

This study contributes to the field of occupational health and safety in managing infectious diseases in the industry. It highlights a crucial need in developing and validating a bilingual (English and Malay) questionnaire, ensuring better understanding and more accurate responses from multilingual Malaysian workers. This questionnaire improves the workplace safety frameworks in assessing their preparedness and implementation of effective interventions. Moreover, this study supports the Department of Occupational Safety and Health (DOSH) Malaysia's efforts in developing a guideline to evaluate the current policies and to identify the gaps for improvement. Academically, this study contributes to the expansion of academic literature with the Content Validity Index (CVI) and Face Validity Index (FVI) index, achieving Cronbach's alpha values between 0.79 and 0.97. Overall, this study provides valuable input for researchers and policymakers in Malaysia with multilingual and multicultural settings.

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