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Assessing The Face and Content Validity of Questionnaire on the Implementation of Occupational Safety and Health Management System within 5S Certified SMEs in Malaysia

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Abstract

This paper presents a comprehensive study on survey instrument design, which includes face and content validity assessments for a newly developed instrument. A set of questionnaires was established as the survey instrument to gain insight into the implementation of occupational safety and health management systems (OSHMS) within 5S (sort, set in order, shine, standardize, and sustain) certified small and medium enterprises (SMEs) in Malaysia, aiming to promote safer and healthier workplaces. The questionnaire consists of 40 items organized into four main constructs: integration of OSHMS and 5S practice, planning and critical success factors, benefits of OSHMS towards SMEs performance, and action for improvement. The validity assessments were conducted through a review by a panel of experts from academia and industry. For face validity, each item underwent evaluation to confirm its alignment with the study's objectives and received a dichotomous rating of either 'YES' or 'NO'. For content validity, a four-point rating scale was employed, ranging from "not relevant" to "highly relevant" to assess how well the items reflect and represent the intended aspect being measured for a specific assessment purpose.These ratings were used to calculate the extent of agreement between raters using a percentage approach and Content Validity Index (CVI). The percentage of agreement obtained for face validity was 80%, indicating a substantial level of agreement among the expert panels, with some questions identified for revision. According to the content validity assessment, the average proportion of items judged as relevant among the six experts (S-CV1/Ave) was 0.96, meeting a satisfactory level. The validity assessments conducted have validated the items in the survey instrument, thereby indicating its readiness for distribution in a pre-test phase.

1. Introduction

In developing a safe and healthy work environment, various factors need to be considered and improved from time to time. Occupational safety and health (OSH) issues are often given a lower priority in small and medium enterprises (SMEs), as they struggle to compete and survive using limited resources at hand (De Merich et al., 2018). Given the resource constraints faced by SMEs, the practice of 5S is seen as an improvement technique that can help them improve not only quality management but also the safety and health of the workforce. The 5S (sort, set in order, shine, standardize, and sustain) practice suits the nature of SMEs, as it is known as a low-cost and technology undemanding approach (Kanamori et al., 2015). Apparently, more research needs to be conducted in the field of OSH to establish a more comprehensive approach to deal with OSH issues, especially for SMEs.

A survey instrument was developed to obtain an overview of OSH Management System (OSHMS) implementation within 5S certified SMEs in Malaysia, aiming for safer and healthier workplace. While numerous researchers in this field have used survey instruments as one of the methods to gather information in their research, the validation process of survey instruments was not extensively discussed nor published (Boateng et al., 2018). The reliability and validity of the measures are key indicators of the quality of a measuring instrument (Kimberlin & Winterstein, 2008). Validation procedures are typically discussed by researchers in the field of social sciences, health, and medicine. As the distribution of surveys is not a popular method in engineering and technology fields, it is difficult to find articles discussing the validation of items constructed for survey instruments developed in these fields.

1.1 Background and Rationale of Study

The pursuit of OSH is not only a matter of ethical responsibility but also a critical component of sustainable business practices. In the Malaysian context, SMEs represent a substantial portion of the nation's economic backbone, contributing significantly to economic growth and employment. However, according to data from DOSH Malaysia, SMEs were responsible for 74.9% of all fatal incidents in 2019. There were no significant changes in the percentage of fatal incidents, with SMEs contributing 74.2% and 74.1%, in 2020 and 2021, respectively (DOSH, 2023).

The 5S is one of the practices that can be practically implemented in SMEs without the need for extensive resources, thus also allowing them to improve the level of OSH practice. Ensuring workstations are equipped with well-organized supplies and logically arranged spaces, coupled with regular cleaning, is crucial for mitigating accidents like tripping, slipping, and ergonomic injuries. The implementation of the 5S methodology not only streamlines the storage of hazardous chemicals but also enhances overall workplace safety (Mehta & Dave, 2020). Expanding upon this framework, the transition to 6S (5S + 1S = Safety) introduces a greater emphasis on safety implementation, going beyond the initial principles of the Toyota Management System (TMS) outlined by Hiroyuki Hirano. By integrating safety as the sixth 'S', a culture of cleanliness, orderliness, and safety is fostered within the workplace. This extension, as advocated by Anvari et al. (2011), not only drives continual improvement but also fosters employee engagement, which are pivotal aspects for the success of both lean manufacturing OSHMS deployment.

Although the 5S system has gained traction in SMEs in Malaysia, there is limited research dedicated to systematically evaluating the effectiveness and implementation of OSHMS in this context. The absence of comprehensive tools for assessing these aspects within 5S-certified SMEs has created a significant gap in the understanding of the OSH landscape. This study aims to address this gap by introducing a questionnaire specifically developed for assessing OSH management systems in 5S-certified SMEs in Malaysia. The instrument was designed with meticulous attention to face validity and content validity to ensure its validity and accuracy in measuring the key factors influencing OSH within these organizations. Validity is the fundamental aspects of questionnaire development, ensuring that the instrument effectively captures the constructs of interest and assess the extent to which an instrument measures what it intends to measure (Kimberlin & Winterstein, 2008). Since there is no statistical test available to ascertain whether a measure sufficiently covers a specific content area or adequately represents a concept, both face validity and content validity typically rely on the expertise and judgment of professionals in the respective field.

The importance of this research cannot be overstated. Achieving a safer and healthier workplace environment in 5S-certified SMEs is pivotal, not only for the well-being of employees but also for the long-term viability and competitiveness of these businesses. This study fills a critical knowledge gap and offers a robust methodological approach for developing questionnaires that can serve as valuable tools for future research endeavors in this field.

This study will provide an overview of the significance of OSH in SMEs, the 5S practice as an enabler for, and the critical role of face validity and content validity in questionnaire development. Subsequently, we will reach into the methodology of questionnaire development and validation, followed by a discussion of the potential impact of the research findings on policy, practice, and future research. By addressing these key aspects, this comprehensive study endeavors to be a foundational contribution to the pursuit of safer and healthier workplaces in Malaysian SMEs.

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1.2 Validation of Instrument

The primary goal of validating a questionnaire is to ensure that the developed tool accurately measures its intended construct across multiple dimensions, including content relevance, structural coherence, appropriateness of response options, and alignment with expected outcomes (Patel & Desai, 2020). In numerous instances, research questionnaires have been distributed without undergoing a validation process, primarily stemming from insufficient awareness of the necessity for validation, time constraints, the complexities of the research scheme, and resource limitations. Face validity and content validity are two important concepts in questionnaire design and assessment. The clarity, unambiguity, reasonability, and relevancy of the questions are being evaluated with face validity, and content validity assesses the instrument's ability to represent and measure a particular construct (Sangoseni et al., 2013). Almansareh et al. (2018) stated that a rigorous assessment of content validity is essential, as the resulting information is crucial to the quality of a newly developed instrument.

Expert panels were selected to be involved in face validity and content validity process, where for face validity the responses were evaluated using percentage calculation method, and Content Validity Index (CVI) is used as an indicator to assess content validity of the instrument. Face validity is said to be lacking in standardization and quantitative measurement (Lynn, 1986; Zamanzadeh et al., 2015), therefore percentage of agreement is used to quantify the response obtained. In content validity process, there are various alternatives available to select an index of expert agreement, where factors such as a focus on estimation of consensus rather than consistency, ease of computation, ease of communication and understanding, provision of both item diagnostic information and scale validity information, and adjustments for chance agreement will be taken into consideration (Polit et al., 2007). As CVI has fulfilled most of the stated criteria, thus selected to be used as the index for content validity evaluation.

2. Methodology

2.1 Description of Survey Instrument

A quantitative survey research design was employed in this study, wherein the instruments were developed based on the constructs identified through an extensive literature review process. The instrument utilized a unilingual (English) format comprising six sections. Section A included general questions related to respondent demographic. Section B consisted of company information, including type of industry, duration of establishment, number of full-time employees, sales turnover, risk assessment and analysis method, and the year the company received 5S certificate from Malaysia Productivity Corporation (MPC). Sections C to F comprised 40 items covering four main constructs: integration of OSHMS and 5S practice, planning and critical success factors (management commitment, employee involvement, strategic planning, and implementation), benefits of OSHMS towards SMEs performance, and action for improvement. A ten-point Likert-type scale ranging from "1= Strongly Disagree" to "10 = Strongly Agree" was used. The instrument was distributed online using Google Form to 5S-certified SMEs as listed by the MPC.

2.2 Administration of Validity Instruments

Both face validity and content validity forms were prepared and distributed using Google Form. Five panels were selected for face validity, while six panels were chosen for content validity. There were inconsistencies in the recommendations regarding the number of panels selected for face validity and content validity. For face validity, it was recommended to involve at least seven to ten panels to ensure sufficient chance agreement (Garbanzo & María, 2011; Thomason, 2008), whereas two to six panels were recommended for content validity (Moulton et al., 2010; Umar & Su-Lyn, 2011). Zamanzadeh et al. (2015) recommended having at least five experts to maintain adequate control over chance agreement.

The panels consisted of individuals from both academic and industrial backgrounds, as detailed in Table 1 and Table 2. Panel members were carefully selected based on their strong academic backgrounds and extensive professional experience, ensuring a profound understanding of the relevant subjects within their respective fields. Their familiarity with the constructs involved in the instrument guarantees a comprehensive assessment during both the face validity and content validity processes.

Table 1 *Background of expert panels for face validity*

No	Academic & Specialization	Position
1	PhD (Ind. Eng. Lean Manufacturing)	Senior Lecturer
2	Bach. (Manufacturing Eng. Tech.)	Engineer
3	PhD (Mechanical Eng.)	Senior Lecturer
4	PhD (Manufacturing Tech.)	Senior Lecturer
5	M.A (Linguistics & ELS)	Lecturer

Table 2 *Background of expert panels for content validity*

No	Academic & Specialization	Position
1	PhD (Mechanical Eng.)	Senior Lecturer
2	PhD (Ind. Eng. Lean Manufacturing)	Senior Lecturer
3	PhD (Ind. Eng. Lean Manufacturing)	Senior Lecturer & Consultant
4	Bach. (Manufacturing Eng. Tech.)	Quality Engineer
5	Master of Business Administration (MBA)	Manager (Malaysia Productivity Corporation)
6	Bach. (Quality Control & Instrumentation)	Quality Management System (QMS) Manager

The distributions of face validity and content validity forms were conducted via email to all experts. The forms were accompanied by introductory cover letters. For face validity assessment, the project objectives and target respondents were included, along with instructions to guide the panel in evaluating the instrument. In the content validity assessment form, in addition to the project objectives, target respondent and instructions, the panels were also provided with the constructs and items involved in the project which led to the development of the instrument. After receiving responses from the panels, the instruments were revised. This involved rephrasing, adding, and removing some of the items to enhance clarity and effectiveness.

2.3 Development of the Scale

For face validity assessment, a dichotomous scale was utilized with the options of 'YES' and 'NO' to indicate the availability of the respective items. The face validity assessment encompassed 10 key criteria meticulously evaluated by the panel of experts. These criteria included freedom from spelling and grammatical mistakes, clear and direct description of questions, clarity and ambiguity of items, correct structure of sentences, adequacy of instructions, appropriateness of item difficulty level, well-designed format, font size and text spacing, free from racial/ethnic, religious, sexual, political bias, and other sensitive issues, and the reasonableness of items in alignment with the instrument's purpose. The panels were provided with space to write additional comments. This comprehensive evaluation ensures the integrity and effectiveness of the instrument in accurately capturing the intended constructs.

Two crucial aspects of assessing content validity are the relevance and representativeness of an assessment tool. The concept of relevance, as advocated by Davis (1992), has been instrumental in measuring content validity, as highlighted by Polit et al. (2007). In the assessment of content validity of this instrument, a four-point scale was used based on the degree of relevance of each item to the measured variables, ranging from 1: Not Relevant to 4: Highly Relevant. Similar to face validity, the experts were given the opportunity to provide additional comments.

2.4 Validity Data Analysis

There are two commonly used methods to evaluate face validity: Cohen's Kappa Index (CKI) and Fleiss' Kappa Index (FKI). In CKI, only two raters are required for the evaluation process, and these rates must be independent (Cohen, 1960). Additionally, in CKI, the same two raters are required to judge all the questions, each question must have the same rating scale, and both raters must assess the same observations. On the other hand, FKI requires two or more raters to evaluate face validity. In addition to this, six other criteria must be fulfilled: each question must use either a nominal variable or ordinal variable, only one response is allowed for each category, the number of categories or observation criteria to select for response should be the same for all raters, independent judgement of each rater, rated targets are randomly selected from population, and the rates are non-unique (Fleiss, 1971).

Due to the criteria outlined for both methods, CKI cannot be applied in this face validity process as it involved five raters. Similarly, FKI cannot be applied since each question needs to be rated by a different group (two or

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more) of raters, meaning that for ten questions, at least twenty raters are needed to complete the process. The face validity process was replicated from Patel and Desai (2020), and a percentage approach was selected to obtain quantitative value for face validity assessment, as recommended by them. The percentage was obtained by summing up the percentages of all questions over the total number of questions. The interpretation and acceptability for percentage of agreement are shown in Table 3 below.

Table 3 *Interpretation and acceptability of percentage agreements (Patel & Desai, 2020)*

% of agreement	Strength of agreement per question or overall question	Action for each question/overall instrument
<80	Poor	Restructure
80-90	Substantial	Revise
90-100	Full	Retain

For content validity assessment, the panels indicated their agreement regarding the relevance of the items included in the instrument using a four-point rating scale. Subsequently, their responses were analyzed using a Content Validity Index (CVI). To evaluate content validity, both item-level and overall scale assessments are conducted, denoted respectively as I-CVI (Item Content Validity Index) and S-CVI (Scale Content Validity Index). Experts are tasked with rating the relevance of individual items, typically employing a 4-point scale, to compute the I-CVI (Polit et al., 2007). For this content validity assessment, the scale used was 1= not relevant, 2=somewhat relevant, 3 = quite relevant, 4 = highly relevant, as suggested by Davis (1992). Lynn (1986) outlines guidelines on acceptable I-CVI values in relation to the number of experts. For five or fewer experts, the I-CVI values must be 1.00, indicating unanimous agreement among all experts that the item is content valid. However, for situations where there are more than five experts, a modest amount of disagreement is acceptable. For example, if there are six experts, the I-CVI must be at least 0.83, indicating one disagreement. S-CVI is the method used to measure universal agreement among experts, representing the proportion of items on an instrument that achieved a rating of 3 or 4 by all the experts. For this content validity assessment, the S-CVI was computed by obtaining the I-CVI for each item, before calculating the average of I-CVI across items. Table 4 summarizes the definition and formula of the CVI indices as outlined by Yusoff (2019), with definitions and formulas formulated and recommended by Lynn (1986), Davis (1992), and Polit et al. (2007).

Table 4 *The definition formula of I-CVI, S-SVI/Ave and S-SVI/UA (Yusoff, 2019)*

The CVI indices	Definition	Formula
I-CVI (item-level content validity index)	The proportion of content experts giving item a relevance rating of 3 or 4.	I-CVI = (agreed item)/ (number of expert)
S-CVI/Ave (scale-level content validity index based on the average method)	The average of the I-CVI scores for all items on the scale or the average of proportion relevance judged by all experts. The proportion relevant is the average of relevance rating by individual expert.	S-CVI/Ave = (sum of I-CVI scores)/ (number of item) S-CVI/Ave = (sum of proportion relevance rating)/ (number of expert)
S-CVI/UA (scale-level content validity index based on the universal agreement method)	The proportion of items on the scale that achieve a relevance scale of 3 or 4 by all experts. Universal agreement (UA) score is given as 1 when the item achieved 100% experts in agreement, otherwise the UA score is given as 0.	S-CVI/UA = (sum of UA scores)/ (number of item)

3. Results and Discussion

The face validity and content validity of the newly developed questionnaire were evaluated by panels of experts with extensive academic and industrial experience relevant to occupational safety and health management systems (OSHMS) and 5S practices. Their expertise ensured a comprehensive assessment of the instrument's clarity, relevance, and representativeness. In addition to providing quantitative ratings, the experts offered qualitative feedback that was instrumental in refining the questionnaire.

3.1 Face Validity Assessment Using Percentage of Agreement

The average percentage of agreement from the expert panels is 80%, as per the interpretation and acceptability of percentage agreements shown in Table 3. The 80% agreement suggests that while the instrument is generally

acceptable, specific structural and linguistic refinements were required, particularly in item clarity and section balance. To revise the instruments, the comments provided by the panel of experts were consulted.

Based on the feedback provided by the expert panels during the face validity assessment, several areas for improvement were identified to enhance the clarity and effectiveness of the questionnaire. Among the feedback given by the experts is the questionnaire should be prepared in a bilingual format (English and Bahasa Malaysia) to cater the target respondents who are from small and medium enterprises (SMEs). The recommendation to adopt a bilingual format reflects the operational reality of Malaysian SMEs, where varying levels of English proficiency may influence response accuracy, thus directly affecting measurement validity.

One key recommendation was the inclusion of brief descriptions at the beginning of each section to clearly communicate the purpose and focus of the items to respondents. Such descriptions are essential in guiding respondents' understanding and ensuring that their responses accurately reflect the intended constructs. In addition, the experts noted that some items were phrased too briefly, which could lead to ambiguity or multiple interpretations. These items were therefore revised to improve clarity and specificity.

The panel also highlighted an imbalance in Section F, which initially contained only a single item. To ensure adequate representation of the construct and improve content coverage, additional questions were developed and incorporated into this section. Furthermore, minor grammatical errors were identified across several items and were corrected to enhance the overall readability and professionalism of the instrument. The experts also recommended improving the questionnaire instructions to better support respondents in understanding how to answer the items, particularly in relation to the response scale used. Lastly, selected items required rephrasing and refinement of sentence structure to improve flow, clarity, and consistency across the questionnaire. These revisions were implemented to strengthen the overall quality and face validity of the instrument.

3.2 Content Validity Assessment Using Content Validity Index (CVI)

The content validity assessment involved six experts who evaluated the relevance of 40 items using a four-point rating scale. The results of the Content Validity Index (CVI) analysis are summarized in Table 5. As recommended by Polit and Beck (2007), for a panel of six experts, the acceptable CVI values should be at least 0.83.

Table 5 illustrates the distribution of expert agreement across the evaluated items. Of the 40 items assessed, 32 items achieved full agreement among all six experts, resulting in an I-CVI value of 1.00. Seven items were agreed upon by five experts, yielding I-CVI values of 0.83, while only one item received agreement from four experts, with an I-CVI of 0.67. Despite this variation, the overall S-CVI/Ave of 0.96 confirms that the instrument demonstrates excellent content validity at the scale level. Items with lower I-CVI values were not eliminated but refined, as partial disagreement often reflects differences in expert interpretation rather than a lack of construct relevance. This approach aligns with established recommendations in content validity research and ensures that the instrument maintains both theoretical integrity and practical applicability.

Table 5 *Summary of Content Validity Index (CVI)*

No. of Experts in Agreement	No. of Items Agreed	I-CVI	S-CVI/Ave
4	1	0.67	0.96
5	7	0.83	
6	32	1.0	

Face validity and content validity assessments were conducted for the newly developed instruments, with the objective of obtaining an overview of Occupational Safety and Health Management System (OSHMS) implementation within 5S certified SMEs in Malaysia, aimed at creating safer and healthier workplaces. The instrument comprises 40 items across six constructs, divided into four different sections. Based on the results of the face validity assessment, the instrument was deemed valid; however, it requires revision based on comments recommended by a panel of experts. The evaluation of Content Validity, using the Content Validity Index (CVI), has yielded an excellent value for the scale-level content validity index (S-CVI). While the instruments initially required revision based on feedback from the expert panels, the subsequent improvements made ensured the relevance, adequacy, and representativeness of the constructs under investigation. These enhancements contribute to the overall validity and reliability of the instruments, thereby strengthening the study's findings and conclusions.

The results of the face and content validity assessments have important implications for both research and practice. From a methodological perspective, the validated instrument provides a robust foundation for future studies examining OSHMS implementation within 5S-certified SMEs, particularly in engineering and technology-related contexts where validated survey tools remain limited. Practically, the instrument offers SMEs and

policymakers a structured means of assessing OSHMS practices and identifying areas for improvement, thereby supporting efforts to promote safer and healthier workplace.

4. Conclusion

In conclusion, the rigorous assessment of face validity and content validity undertaken in the development of the questionnaire for evaluating Occupational Safety and Health Management Systems (OSHMS) within 5S certified small and medium enterprises (SMEs) in Malaysia has yielded promising results. The process is crucial to determine the validity of the items in measuring the intended construct. Moreover, the clarity, unambiguity, reasonability, and relevancy of the instrument were also evaluated. The face validity and content validity processes had provided a valid instrument which is sufficient to evaluate the relevant constructs involved in the study. The satisfactory outcomes of both validity processes underline the instrument's validity, laying a robust foundation for further evaluation. With these improvements in place, the next step involves conducting a pre-test to assess the instrument's reliability with actual respondents, thereby advancing our understanding of OSHMS implementation in SMEs.

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Conflict of Interest

Authors declare that there is no conflict of interest regarding the publication of the paper.

Author Contribution

Authors take public responsibility for the content of the work submitted for review.

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