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Developing and Validating an Assessment Instrument for Organizational Performances of Construction Organization

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ABSTRACT

Evaluating the performance of construction organizations is important for ensuring the success of construction projects-based nature. However, there are no standardized instruments and a single way to measure how well construction organizations perform, making it difficult for researchers and practitioners to get an accurate picture of their performance. This study aims to develop and validate an instrument for assessing organizational performances of construction organizations. The instrument was reviewed by an eight (8) panel of experts, who rated the items on their relevance (essential) to the construct of organizational performance. The Content Validity Ratio (CVR) results showed that 21 of 59 items were considered the most critical by the content experts, and the results for Item Level Content Validity Index (I-CVI) showed that 46 items were considered appropriate. These results showed that the instrument has adequate content validity. The outcomes of this study have important implications for the use of this instrument in organizational performance assessment for the construction industry. The instrument can be used to measure construction organizational performance in a comprehensive and systematic way. This will help researchers and practitioners to better understand the factors that contribute to construction organizational performance and to develop interventions to improve this construct.

1. Introduction

The construction industry faces challenges of heightened competition and unstable operating environments, which is true for both developed and developing countries [24]. However, to survive and thrive in the ever-changing and competitive construction industry, it is essential for organizations to constantly seek ways to improve their performance and gain a competitive edge [21]. Organizational performance has been a prominent concern in this research. *"Organizational performance"* is defined by Cho and Dansereau [4] as the evaluation of a company's performance in relation to its goals and objectives. Furthermore, Tomal *et al.,* [25] describe the *organizational*

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performance as the tangible outcomes or achievements of an organization when compared to its intended targets or outputs.

The performance of the organization is affected by many factors. Changing organizational structures, increased knowledge and new innovative technologies, increased specialization and interdisciplinary collaboration, consumerism, environment protection, and changes in regulations are some of the forces and trends that are some of the issues that have a part to play with regards to the performance of the organization [22]. In addition, the management of construction organizations needs to know how to do things well in order to succeed. This knowledge will help them to design and implement efficient processes that will improve their performance.

Gimbert *et al.,* [9] and Indeed [10] defines a performance measurement system (PMS) as a set of metrics that organizations use to track their performance. These metrics can be financial or non-financial, and they help organizations to make better decisions by providing them with data about how they are doing. The development of PMS in organizations has evolved over time and is a continuous process. Therefore, the development of performance measurement systems can help organizations quantify their competitive advantage. It has been suggested by Yang *et al.,* [30] that construction organizations can measure their performance at three different levels: project, stakeholder, and organizational. This measurement is based on the degree of success in achieving business objectives [3]. However, evaluating the performance of a construction organization is important for ensuring success at all levels. By adopting a performance management system at three different levels, organizations can align their long-term strategy with their performance measurement system. This can motivate employees and improve overall performance.

Initially, performance measurement in construction primarily focused on the project level [30]. The first level of performance measurement in construction is the project level. Three key performance indicators are typically used to measure project performance: time, cost, and quality [12]. However, over the past decade, the focus on performance measurement in the construction industry has expanded from the project level to the organizational and stakeholder levels. The stakeholder level focuses on the relationships between different contracting parties, such as owners, contractors, and consultants. Wang and Huang [27] showed that the performance of stakeholders is linked to project success.

The third level of performance measurement in the construction context is the organizational performance level. The importance of identifying an organization's performance is evident in all global market sectors. Due to the simultaneous execution of numerous projects and the management of numerous input resources in the construction industry, it is critical to perform performance measurement at the organizational level [14]. Many measurement frameworks have been developed over the years to measure performance at the organizational level. These frameworks include key performance indicators (KPIs), the balanced scorecard (BSC) model, and the European Foundation for Quality Management (EFQM) excellence model [14]. Therefore, the choice of which framework to use will rely on the specific need of the organization. Some factors to consider include the organization’s size, industry and strategic goals. In light of this, measurement frameworks can offer and provide a number of benefits for organizations such as improved decision-making, increased accountability, improve communication between different levels of the organization and enhanced motivation.

Hence, organizational performance in construction represents the overall performance that will guarantee an organization's survival in a competitive business environment [24]. This differs from project or stakeholder-level measures, which only capture performance in a single dimension. So, the extended contingency theory approach proposes that effective organizational performance relies on the fit between an organization’s strategy, structure, quality, and culture as well as the

external environment in which the organization operates. This theory approaches recommends and suggests that determinants such as project efficiency, business success, preparation for the future [18], transformational leadership [16], knowledge sharing [11], human resource management, top management commitment [17], and project portfolio management quality [11], can all impact organizational performance assessment in construction organizations and may help organizations to develop more effective strategies and structures for success.

The main objective of the current study is to determine the factors that influence organizational performance at the organizational level within the construction industry. The study aims to develop and assess the content validity of assessing these organizational performance determinants using the Content Validity Ratio (CVR) and Content Validity Index (CVI) across five (5) constructs. Therefore, this assessment serves as an initial step before the main data collection, aiming to form a conclusive understanding of organizational performance determinants from the construction organizations' perspective.

2. Methodology

A valid instrument is one which measures what it is supposed to measure [8]. It helps researchers interpret variables and the relationship between variables more theoretically [23]. Validity is a vital factor in selecting or applying an instrument. Traditionally, three types of validity may be established – content, criterion and construct validity. Since content validity is a prerequisite for other validities, it should be given more importance during the instrument construction. Content validity is a critical step in developing a new measurement scale and represents a beginning mechanism for linking abstract concepts with observable and measurable indicators [28].

This study used a quantitative research method to examine the factors affecting organizational performance in Malaysian construction organizations. The researcher distributed a specific questionnaire to panels of content experts to assess the validity of these factors. The questionnaire was designed based on the extended contingency theory, which suggests that organizational performance depends on how well an organization's strategy, structure, quality, and culture align with the external environment. The results of the questionnaire survey were assessed using two metrics: Content Validity Ratio (CVR) and Content Validity Index (CVI). The CVR measured how well each item on the questionnaire reflected the intended construct, while the CVI provided a more comprehensive assessment by considering both the number of items and the overall rating of the questionnaire by the experts. In the following sections, we will provide an overview and analysis of the main findings of this research, focusing on the results obtained from the CVR and CVI analyses.

2.1 Literature Review

The first method is through the literature review of five existing organizational performance and project success construct assessment instruments in order to identify critical components in determinants of organizational performance in construction organizations. The purpose of the literature review is to develop organizational performance determinants instruments in the form of questionnaires (i.e., CVR and CVI – 3-point scale).

2.2 Instrument and Questionnaire Survey

The questionnaire "Determinants of Organizational Performance: Perspective from the construction organization in Malaysia" is a 59-item survey that assesses five (5) constructs related to organizational performance. Table 1 shows the categories and indicators used by the judges to validate the instrument tool. Each item was assessed by a panel of experts using a three-level scale (not necessary/not clear, acceptable, and essential to measure construct/very clear) to determine its importance and clarity.

Table 1
Categories and indicators used by the judges to validate the tool

Categories	Indicators
Essential	The item is not necessary to measure the construct
(The scale of Importance)	The item is acceptable
	The item is essential to measure the construct
Clarity	The item is not clear
(The scale of Clarity)	The item is acceptable
The item can be understood easily	The item is very clear

2.3 Classification of Experts/Respondents

A minimum of five (5) experts is recommended to review an instrument to ensure that the items are essential, relevant and comprehensive [15,28,29]. Furthermore, the maximum number of experts has not been determined, but it is unlikely that more than ten experts would be needed. In light of this, a total of eight (8) respondents have been chosen as subject matter experts for the purpose of this study. Table 2 shows the information on the experts including the experts' designations, professional and academic backgrounds, and experience in the construction industry. Based on the experts' backgrounds and experience, it is reasonable to conclude that they have the knowledge and expertise to review the instrument and provide valuable feedback. The experts' feedbacks are used to improve the content of the instrument and ensure that it is a valid measure of organizational performance in construction organizations.

Table 2
Sample and respondents of the content validity

No	Experts / Respondents	Industry / Academia	Area of Expertise	Experience in Industry
1	Project Director & Project Manager (Sr. Ts. Dr)	Industry	Construction & Civil Engineering	23
2	Senior Manager (Ir. Dr)	Industry	Construction & Civil Engineering	2
3	Project Manager	Industry	Construction & Property Estate	12
4	Senior Engineer, Project	Industry	Construction & Civil Engineering	13
5	Associate Professor (Ir. Ts Dr)	Academia	Construction Management	8
6	Associate Professor (Dr)	Academia	Construction Management	15
7	Senior Lecturer (Dr)	Academia	Project Management	10
8	Senior Lecturer (Dr)	Academia	Business Management	4

2.4 Content Validity Ratio (CVR)

According to Cooper and Schindler [6], content validity is a degree of measuring instruments 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 the judgmental method and panel evaluation with CVR. The CVR indicates the level of agreement among experts regarding whether an item is essential [13]. In addition, a 3-point scale was recommended to rate each item: (1) not necessary to measure the construct, (2) acceptable (but not essential); and (3) essential to measure the construct [1,13,31]. The revised CVR critical table by Ayre and Scally [1] will be compared against the CVR value to determine whether the item should be deemed critically significant. The CVR is calculated on the formula that Lawshe [13] developed:

$$\text{Content Validity Ratio (CVR)} = \frac{\left(ne - (N/2)\right)}{(N/2)}$$

where,

ne : number of expert panel members indicating an item *'essential'*
N : number of expert panel members

The outcome of this formula is that:

i. When all say "essential", the CVR is 1.00 (100% agreement)
ii. When the number saying "essential" is more than half (>50%), but less than all (<100%), the CVR is between zero and 0.99, and
iii. When fewer than half (<50%) say "essential", the CVR is negative.

2.5 Content Validity Index (CVI)

In contrast, another approach is the CVI instruments proposed by Lynn [15] and Polit *et al.,* [19] which can be used to rate each instrument item in terms of its relevancy or clarity to the construct on a 3-point scale: (1) not clear, (2) acceptable or somewhere acceptable and (3) very clear. The Content Validity Index (CVI) is a measure of how well a measurement tool represents the construct it is designed to measure [13]. A panel of experts rates each item on the tool for relevance and clarity.

The CVI is calculated by dividing the number of experts who rate an item as relevant or clear by the total number of experts. The CVI can be calculated at the item level (I-CVI) or at the scale level (S-CVI). The S-CVI can be calculated using different methods, such as S-CVI/Ave or S-CVI/UA. These methods take into account the level of agreement among experts [13]. S-CVIs are a measure of content validity that is calculated as the proportion of items on an instrument that are rated as *"relevant/acceptable*" or *"very relevant/very clear*" by a panel of content experts. This is contrast with I-CVIs, which are calculated as the average rating of each item on an instrument [2].

3. Findings and Discussion

The main findings obtained from the questionnaire survey were presented through an analysis of the Content Validity Ratio (CVR) and Content Validity Index (CVI).

3.1 Analysis of the Content Validity

Table 3 presents each construct's components and the number of items. The instrument used to measure the determinants of organizational performance consists of a total of 59 items, including the respondent's profile questions. These items are divided into five (5) constructs: transformational leadership (4 items), knowledge sharing (13 items), internal supports (10 items), i.e.; human resource management (5 items), top management commitment (5 items), project portfolio management quality (12 items), and organizational performance (13 items). These constructs have been taken and adapted from the assessment instrument mentioned earlier [17]. Hence, the items developed from the literature search and existing instruments can be used and adapted as input for further data collection through questionnaires of organizational performance instruments administered by subject matter experts.

Table 3
Components of Organizational Performance Instruments

No	Constructs	Items	No. of items
1	Transformational Leadership	Integrity	1
		Trust & shared sense	1
		Tackle problems	1
		Inspire & motivation	1
2	Knowledge Sharing	Knowledge sharing within the project (KSWP)	6
		Knowledge sharing among Projects (KSAP)	3
		Knowledge sharing within the Organization (KSWO)	4
3	Internal Support	Human Resource Management	5
		Top Management Commitment	5
4	Project Management Portfolio Quality	Information Quality	6
		Resource Allocation Quality	3
		Cooperation quality	3
5	Organizational Performance	Project Efficiency	3
		Business Success	3
		Preparation for Future	5
		Other Related Issue	2
TOTAL			52

3.2 Content Validity Ratio (CVR)

Table 4 shows that 21 out of 52 items were identified as critical by the content experts. These items are related to knowledge sharing (3 items); internal support (5 items); project management portfolio quality (6 items) and organizational performance (7 items). According to Ayre and Scally [1], an item score of CVR=1.00 for eight experts (N=8) is classified as critical.In summary, all respondents have agreed that these 21 items are essential to incorporate in the organizational performance instrument. However, the remaining 31 items will be kept for further testing of their content validity index (CVI).

Table 4
CVR critical items in Organizational Performance instrument

Construct No	Items	No. of sub-items
1	Transformational leadership	-
2	Knowledge sharing	3
3	Internal Support	5
4	Project management portfolio quality	6
5	Organizational performance	7
TOTAL		21

3.3 Content Validity Index (CVI)

Table 5 shows the criteria for evaluating the Content Validity Index (I-CVI). Based on the I-CVI scores, 46 items with scores ranging from 0.875 to 1.000 are considered appropriate for inclusion in the organizational performance determinants instrument. Nine (9) items (RP5, TL8, TL10, KS15, KS16, IS27, IS28, PQ37, and PQ42) with scores ranging from 0.70 to 0.79 need further revision. However, the remaining four (4) items (RP6, RP7, IS29, and IS40) with scores below 0.70 should be eliminated from the instrument.

Table 5
Evaluation criteria for I-CVI [7,5,19]

I-CVI classification	No. of items	Score
>0.79	46	Appropriate
0.70 – 0.79	9	Needs revision
<0.70	4	Eliminate

In addition to being evaluated for elimination using the Content Validity Index (I-CVI), all the items were also reviewed and assessed. Table 6 shows the changes made to the items RP05 *(exclusion due to respondent profile)*, TL08, TL10, KS15, KS16, IS27, IS28, PQ37, and PQ42 to improve their content validity for organizational performance instruments (before and after revision). The changes were made based on the Scaled Content Validity Index (S-CVI/Ave), which is a measure of content validity that considers the average agreement of a panel of experts [19].

The content validity of the organizational performance instrument was assessed using the S-CVI/Ave method. This method measures the extent to which experts agree that the items in an instrument are relevant to the construct that it is intended to measure. A score of 0.900 or higher is adequate content validity [20,26].

The results of the content validity analysis are shown in Table 7. The initial S-CVI/Ave score for the instrument was 0.888, which was below the threshold for adequate content validity. However, after nine (9) items were revised and four (4) items were eliminated, the S-CVI/Ave score increased to 0.907, which is adequate.

The results suggest that the organizational performance instrument, with 55 items, has adequate content validity. This means that the items in the instrument are relevant to the construct of organizational performance and that the instrument is likely to measure organizational performance accurately.

Table 6
Content validity of Organizational Performance instrument (before and after revision)

Item No.	Before revision	After revision
TL08 (Item: Transformational Leadership)	As a leader, I deal with my employees with integrity and appeal to them emotionally	As a leader, we deal with our employees with integrity and by considering their emotions.
TL10 (Item: Transformational Leadership)	I help employees learn to tackle and solve problems on their own	We help employees learn to tackle problems on their own.
KS15 (Item: Knowledge sharing within the project)	Project members always provided know-where or know-whom information to each other in an effective way.	Project members always provided *know-where* information to each other in an effective way.
KS16 (Item: Knowledge sharing within the project)	Project members tried to share expertise from education or training in an effective way.	Project members tried to share expertise from training in an effective way.
IS27 (Item: Human Resource Management)	There is always training and course related to quality for employees going on in our company.	There is always training related to quality for employees to going on in our company.
IS28 (Item: Human Resource Management)	Superiors/managers are involved in quality training.	Managers are involved in quality training.
PQ37 (Item: Project Portfolio Management Quality – *Information Quality*)	The presentation of information on the project portfolio is standardized at the top management level	The way that information about the project portfolio is presented is standardized at the top management level.
PQ42 (Item: Project Portfolio Management Quality – *Resource Allocation Quality*)	It requires time-consuming coordination loops until the portfolio resource allocation is finished.	The process of allocating resources to the project portfolio can be time-consuming, as it requires multiple rounds of coordination between different stakeholders.

Table 7
Content validity of Organizational Performance instrument (before and after modification)

Before modification (59 items)			After modification (55 items)		
I-CVI classification	No. of total items	Total score of I-CVI	I-CVI classification	No. of total items	Total score of I-CVI
>0.79	46	43.125	>0.79	46	43.125
0.70 – 0.79	9	6.75	0.70 – 0.79	9	6.75
<0.70	4	2.500	<0.70	-	-
Total		52.375	Total		49.875
S-CVI/Ave		0.888	S-CVI/Ave		0.907

Note: I-CVI= item-level-CVI; S-CVI/Ave= scale-level-index/Averages

4. Conclusions

The Content Validity Ratio (CVR) scores showed that 21 out of 52 items were the most critical by the content experts. These items were related to knowledge sharing, internal support, project management portfolio quality, and organizational performance. The remaining 31 items were retained for further Item Level Content Validity Index (I-CVI) assessment. The I-CVI results showed that 46 items in the organizational performance instrument were appropriate. Nine (9) items were suggested to be revised and four (4) items were suggested to be eliminated. After these modifications, the total number of items in the instrument was 55.

The S-CVA/Ave score revealed that the content validity of the instrument was adequate. This means that the items in the instrument are relevant to the construct of organizational performance. The instrument is also reliable, and the items selected are the most appropriate for the construct. The method used to assess the content validity of the instrument was a two-stage process. The first stage involved the development of the instrument, and the second stage involved a panel evaluation of the items. This process is a more accurate approach to criticizing research instruments.

This research is part of an ongoing PhD research study at the Universiti Malaysia Pahang Al-Sultan Abdullah (UMPSA). The study aims to develop an instrument to measure construction organizations' performance in a comprehensive and systematic way. This will allow researchers and practitioners to better understand the factors that contribute to construction organizational performance and to develop interventions to improve this construct. The study also aims to improve and enhance the delivery of Malaysian construction organizational performance through establishing and extending contingency theory approach.

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