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RESEARCH PAPER

A content validity study of the test of valuers' support for capturing sustainability in the valuation process in Nigeria

Abayomi Ibiyemi[a], Yasmin Mohd Adnan[a], Md Nasir Daud[a], Segun Olanrele[a] and Abiodun Jogunola[b]

[a]Department of Estate Management, Faculty of Built Environment, University of Malaya, Kuala Lumpur, Malaysia; [b]Department of Estate Management, Faculty of Environmental Sciences, University of Lagos, Lagos, Nigeria

ABSTRACT

Property valuers' support for sustainability has a significant impact on the resolution to reflect its dimensions in the valuation process. The study presents the content domain of the valuers' perception of sustainability reporting in Nigeria for the purpose of identification and eliciting the character. Based on informed judgment, it engages a panel of 5 experts who possess expertise in real estate valuation, environmental management and academics/consultancy to rate 26 items with a 4-point Likert scale for the content validity index (i-CVI), the scale content validity index (s-CVI) and the content validity ratio (CVR) grounded on relevance to the property valuers' willingness to capture sustainability in the valuation process.The results show that (i-CVI > 0.75 and; s-CVI>0.80. Lawshe's content validity ratio is at +0.692. The measuring scale is content-valid and the panel size is adequate at a Mean Proportion Agreeing of 0.876. Only 21 items should be adopted for a further Cronbach alpha test of reliability.The paper argued for consistent and explicit content validation in sustainability research to avoid probable chance effects. Content validation helps to provide reliable data for causal model development of the knowledge management (KM) requirements for the integration of sustainability into real estate valuation.

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Methodological research; content area measurement; capturing property sustainability; valuation

Introduction

This study presents the required evidence of what is to be measured and reported in the context of content coverage for the sustainability integration into property valuation and the valuers' knowledge-based support scale. The scope encompasses the content area measurement for reliable operational definitions of composite constructs like valuers' supports and the theory-driven reflective models for knowledge perceptions. It is imperative that the domain of property valuers' willingness to capture sustainability issues in the valuation process in Nigeria be explored prior to finding an appropriate valuation approach that can reflect the issues. The property valuers' willingness scale has a great potential to be promoted as a good measurement instrument, otherwise, if constructs relating to it have insufficient content validity (CV), the scale is expected to

CONTACT Abiodun Jogunola yomi1004@googlemail.com

fail the model fit tests, and the hypothesised factor structure of the assessment instrument may not be confirmable because the items would not be able to demonstrate significant magnitudes of covariance. In addition, formative models could not be properly evaluated without rigorous validity of the content domain of constructs (Hair, Hult, Ringle, & Sarstedt, 2013). This could have implications for the internal validity of a study by weakening the estimates of the parameters of causal and functional relationships and the prediction of behaviour. Moreover, inferences from assessment instruments with unsatisfactory content validity would produce unreliable research outcomes even when other indices of validity are satisfactory. On the other hand, Mungule and Van Vuuren (2016) asserted that content relevance could support the construct validity and give confidence about instruments by measuring the appropriate sampling of the content domain of items in a questionnaire.

In spite of the reported importance of CV, Ayre and Scally (2014) proclaimed that researchers seldom report the item content validity index (i-CVI) in the literature. Moreover, there is no existing information on the CV of the measures of property valuers' support scale for capturing sustainability in Nigeria (Ibiyemi, Adnan, Daud, & Piaw, 2018). The problem suggests that the scale's quality regarding property valuers' willingness to capture sustainability issues in the valuation process could be compromised while research results could also become misleading. Thus, it is essential to establish content validity as a necessary initial task in the construction of a new measurement procedure or the revision of the existing one. It is also quite possible that data could overrepresent or underrepresent some facets of the constructs and also reflect variables outside the construct domain if content validity is not reported.

The research tasks, set out to achieve the research aim, would include: (1) the examination of the relevance, clarity, simplicity, and non-ambiguity of the questions used for each dimension of a construct (2) the coding criteria, that is, the measure of the constructs used and the variables format – ordinal variables – (3) the scales used – Likert scales. (4) the definition of the constructs in terms of the number of dimensions and indices. (5) estimation of the Lawshe's content validity ratio (CVR). Tasks (1–5) support the study purpose, which is to investigate and establish the content domain for property valuers' willingness to capture sustainability issues for valuation purposes in a new measuring scale.

Review of literature

The literature is reviewed in accordance with the research problem, the tasks raised, the variables of the study, keywords in title, and other supplementary issues as follows:

Property sustainability integration into the valuation process: valuers' perspective

The general conceptual underpinning of the perspective and support study is conjectured that the knowledge about the potential sustainability benefits summarised in literature could build up the valuers' support system for sustainability integration into real estate evaluation. Madew (2006), Addae-Dapaah, Liow, and Neo Yen Shi (2009) as well as Babawale and Oyalowo (2011) described the benefits of property sustainability as high

building value (BHBV), cost savings (BCS), lowered risks (BLR), enhanced productivity gains (BPG), and impact minimisation (IM). Valuers' support could then be validated with their agreement to have green rating tools, pay a premium for green features and recommending green features to other users. Other indications would be that property valuation should reflect sustainability; that a sustainability-related approach (ISRO) approach would be an appropriate approach that could induce support for integration and compliance with local sustainability requirements. This concept was also part of the postulations of Gloet (2006) **and** Petrini and Pozzeboh (2009) who developed support systems founded on knowledge and business intelligence (BI). Babawale and Oyalowo (2011) reviewed the perception of valuers for incorporating sustainability into real estate valuation in Nigeria. The study cliqued the economic, socio-environmental features as practical variables for sustainability. It advanced evidence that there is a growing responsiveness of the need to integrate sustainability into real estate valuation theory. Respondents tended to explain property sustainability in its social, rather than the economic and environmental dimensions. The work suggested the improvement to the present knowledge of sustainability to effectually interprete the other dimensions for property valuation purposes. Investors, property occupiers, the government and valuers were recognised as the prime drivers of the sustainability in the region.

Knowledge integrates, applies and extends insights to the study of sustainability systems and programmes that prompts sustainable development actions. Linking knowledge for action requires the understanding of open channels for communication between stakeholders. However, Evangelista and Durst (2015) advocated sustained transition to sustainability to be structured through scholarly research, practical experimentation and comparative learning. The view that was supported by Cash et al. (2002) in a series of case studies in which the relevance of KM and information systems (IS) in sustainability have been demonstrated. Also forecasting systems from KM strives to produce timely information allowing documentation of those system features that promote the operational use of predictive information (Cash et al., 2003; EICES Guest Blogger, 2014). Even so, Ibiyemi, Adnan, and Daud (2016) reiterated that it is KM that explains how sustainability characteristics influence political, economic and natural systems outcomes. Active, iterative and inclusive communication between experts, decision-makers and the community proves crucial to systems that unbundle knowledge in the world of actions that promote sustainability.

The significance of content validity in property sustainability and valuation

In Nigeria, valuers' support (SUP) for capturing property sustainability in valuation is associated with perceived benefit-related Lower Risks (BLR) and Cost Savings (BCS). The relationship between BLR and SUP has demonstrated a strong influence on the valuers' support (SUP) construct than BCS (Ibiyemi, 2018). Valuers also support the integration as suitable for reflecting compliance with prescribed local sustainability requirements. Ibiyemi et al. (2018) stressed that the support is motivated by: (1) the perception that sustainability would provide future generational needs (2) that there would be less pollution by adopting sustainability initiatives (3) the expectation that sustainability could help fight global warming. The theoretical postulations of Addae-Dapaah et al. (2009) about relationships are supported in part because only BLR and BCS influence the

support factor in the research model while there is a deviation from the theoretical model that BHBV, BPG, quality of life (BQL) would also be significant predictors of SUP (Ibiyemi, 2018). BHBV, BPG, BQL were less considered by the valuers as probable benefit nodes for sustainability. Polit and Beck (2006) underscored the significance of content validation of the unobserved variables by affirming that researchers would have been less guided about revising, deleting or substituting the questionnaire items to enhance their measuring scale's quality.

The literature agrees that CV is a matter of judgment from careful conceptualisation and domain analysis prior to item generalisation and the subsequent evaluation of relevance. Nevertheless, Halek, Holle, and Bartholomeyczik (2017) clarified that the construct cannot explain the variance obtained for the content-invalid instrument. For that reason, content validity affects the inferences that can be drawn from the observed data. López, Prados, and Romera (2014) emphasised the relevance and representativeness of an assessment instrument. The utilisation of a content-invalid assessment instrument degrades the inferences derived from the obtained data for the same reason of the construct's inability to explain variances in obtained scores. A content-invalid assessment instrument could unduly influence the importance of research results or omit some facets of the construct (Gómez, 2009; Hueso & Cascant, 2012). The elements of the assessment instrument that is, individual items, response formats, instructions, observation codes, time-sampling parameters and the situation in which observation occurs, should be appropriate to the scale to establish relevance for the target construct. Content validation affords evidence about the construct validity of an assessment instrument. The measures of the predictive, concurrent, validity, discriminant and convergent validity, criterion-related validity, and factor structure provide evidence about the construct validity of an instrument. Nonetheless, content validity is an important component of construct validity because the evidence of the elements relevance and representativeness are also inherent in construct validity. (Anastasi, 1988; Zamanzadeh et al., 2015).

Measuring the content validity index and the ratio

Halek et al. (2017) expounded that there are two standards for ensuring content validity of a new measuring scale: First, the sampling of the items and second, the method of constructing the items. Two judgments are necessary for CV: *(1)* The measurable extent of each item for defining the constructs and *(2)* The set of items that represents all aspects of the traits. CV should also be established in two stages; the development and judgment stages (Yaghmale, 2003). Larsson et al. (2015) reiterated that addressing content validity should begin with instrument development. The development of instrument is to identify "what domain of construct" should be measured. This can be determined through literature reviews, interviews, and focus groups. By determining a precise definition of constructs of interest, a clear picture of limitations, dimensions, and components of the subject can be ascertained. The qualitative method can be helpful for determining the domain and concepts of construct that are of interest. There is neither a completely objective method for determining the content validity of an instrument nor any statistical approach (Polit & Hungler, 1991; Zamanzadeh et al., 2015). Nonetheless, content validity in the judgment stage is based on quantitative evidence (Wilson, 1989). The subjective professional judgment is required to determine the extent to which the scale was

designed to measure a construct of interest when examining the CV in the judgment stage (Beckstead, 2009). Waltz and Bausell (1983) pointed out that CV depends on subjective or professional judgment while Bums and Grove (1993) suggested the inclusion of at least five experts in that field. Wilson (1989) insisted that five to ten experts would be useful to judge the content domains of a scale through the use of rating scales. Some methods of quantifying experts' degree of agreement regarding the content relevance of an instrument have been proposed. These methods are:

(1) Averaging the experts' ratings of item relevance and using a pre-established criterion of acceptability as in Beck and Gable (2001).
(2) Quantifying agreement of item relevance by 3 or more experts using coefficient alpha (Waltz, Strickland, & Lenz, 2005).
(3) Calculating the multi-rater kappa coefficient as proposed by Wynd, Schmidt, & Schaefer, 2003).

However, the most widely reported measure of content validity is the content validity index (Beckstead, 2009; Waltz et al., 2005). Waltz and Bausell (1983) and Lynn (1986) stressed that these item ratings are typically on a 4-point ordinal scale. Nevertheless, Lynn (1986) acknowledged that 3-or 5-point rating scales might be considered, but advocates using a 4-point scale to avoid having a neutral point. Since then, several different labels for the four points along the item-rating continuum have appeared in the literature, such as 1¼-not relevant, 2¼-somewhat relevant, 3¼-quite relevant, 4¼ -highly relevant (Davis, 1992). Polit and Beck (2004) settled that the qualitative evaluation CVI would be in two stages: (1) CV of the individual items (2) CV of the overall scale. Items with an i-CVI score <0.75 could be revised, removed or substituted as the case may be (Kovacic, 2017; Lynn, 1986).

Content validity ratio (CVR) calculates the tables of critical values to justify the number of experts used (Lawshe, 1975). According to Lawshe (1975), if more than 50% of the experts indicate that an item is essential, that item has at least some content validity. Greater levels of content validity exist as larger numbers of panellists agree that a particular item is essential. Using these assumptions, Lawshe developed a formula termed the content validity ratio: $CVR = (n_e - N/2)/(N/2)$ where CVR = content validity ratio, n_e = number of experts indicating "essential", N = total number of experts. This formula yields values which range from +1 to −1; positive values indicate that at least half the experts rated the item as essential. The mean CVR across items may be used as an indicator of overall test content validity. Wilson, Pan, and Schumsky (2012) provided a modified Lawshe (1975) presented the table of critical values for the CVR by which a test evaluator could determine, for a pool of SMEs of a given size, the size of a calculated CVR necessary to exceed chance expectation.

Methods

This study is operationalised in the context of the knowledge of Industrial sustainability benefits in relation to the valuers' support scale for its integration into the valuation process. Yaghmale (2003) and Waltz et al. (2005) offer the table of assessment for the five (5) content validity experts Appendix A). A literature study was used to generate

a representative sample of items for the knowledge-based valuers' support for sustainability integration into property valuation. At this stage, the scale was developed with thirty-four (34) items and 6 constructs.

Selection of the variables used for the study

The thirty-four (34) knowledge-based sustainability benefits and support items/variables were selected from the studies of Madew (2006) and Addae-Dapaah et al. (2009) based on their specific significance to the study objectives, questions and the valuers' perception. A face validity test reveals that eight (8) items of the scale were not related to the domain of valuers' support for integration. The eight (8) items were removed after a face validity test (remaining 26 variables). The items dropped are as follows: Siting and structure design efficiency a1, secure grants and subsides b4, reduced societal costs of landfill creation. b5, fewer complaints about comfort and related problems c5, a user having more control over the environment d6, Minimise site impact f5, pay a premium for green features s2, and " sustainability-related obsolescence would induce firms to comply with metrics and invest in further initiative s6". The constructs and the 26 variables observed variables are distributed as follows:

High Building Value (BHBV): Faster tenants' lease up a2, Valuation premium a3, Better market distinction a4, Higher prestige a5.

Cost Savings (BCS): Water conservation b1, Energy efficiency b2, Lower services maintenance costs b3, Fewer claims on medical costs b6.

Lower Risks (BLR): Reduced wastewater pollution and degradation c1, lower risk of unsustainable resource uses c2, reduced liability risks c3, reduced health and safety risks c4

Productivity Gains (BPG): Boosts creativity d1, higher morale d2, improved employee productivity d3, improved indoor quality for staff welfare d4, user satisfaction – d5

Quality of Life (BQL): Sustainability provides the future generation needs – f1, Less pollution – f2, Fight global warming – f3, minimise wastes – f4

Support (SUP): Invest in Green industrial building rating tools s1, recommend green features to others s3, the relationship between sustainability and building obsolescence s4, property valuation to reflect sustainability s5, Would support the cost/ISRO approach where no market exists s7

The experts

The CV of the items was given to five (5) experts from the National Environmental Standards Regulations Agency (2 experts), State Environment Protection Agency (2 experts) and a Consultant Valuer/Academic. The selection was by judgmental sampling. The experts are labelled as follows:

Experts A and B: Experts from the National Environmental Standards Regulations Agency.

Experts C and D: Experts from the State Environment Protection Agency

Expert E: Consultant Valuer/Academic

The experts have postgraduate degrees in the related fields of environmental management and sciences, safety and risk engineering and real estate valuation. In addition, they possess the requisite knowledge evidenced by their previous academic publications, and 15–26 years' experience on sustainability issues and property valuation. 2 of the 5 experts (Experts C and E) handled the more critical CV of the overall scale. The researcher gave a copy of the constructs and observed variables (see Table 1) and the questionnaire scale to the experts and explained the aim and objectives/tasks of the study to them individually. The CVI developed by Waltz and Bausell (1983) was used (see Appendix A). The 5 experts were then asked to rate each item based on relevance, clarity, simplicity and ambiguity on the four-point scale. (see Table 1 and Appendix B1-2).

CVI ratings

For the i-CVI, the computation is the number of experts giving a rating of 3 or 4 (quite relevant/very relevant). Rating 1 or 2 (not relevant/somewhat relevant) are ignored for the purpose of computing the i-CVI. The s-CVI expresses the proportion of items given a rating of 3 or 4 (quite relevant/highly relevant) by the two expert raters using the 4-point scales of item relevance.

Lawshe's CVR was used to determine the adequacy of the panel size of experts and the overall content validity. A review of 42 different social science articles retrieved from the Scopus database was carried out upon which the non-prevalence of CV reporting in the literature was drawn.

Results and analysis

Table 1. shows the study scale of measurement, items, and the constructs employed.

CV of the individual items (i-CVI)

The researcher analysed the results of the content validity of the items in the scale. The items that had CVI over 0.75 remained and the rest held for either revision, substitution or deletion as the case may be. Each item 's i-CVI is computed as the number of experts giving a rating of either 3 or 4 (thus dichotomising the ordinal scale into relevant and not relevant), divided by the total number of experts. For instance, an item that was rated as quite or highly relevant by four out of five experts would have an i-CVI of .80. The implication is that four (4) experts have to agree to any individual item as relevant to count towards the i-CVI. The mean i-CVI is the summation, = ∑i-CVI, divided by the number of items (26). The Mean Expert Proportion is the ∑Proportion relevant by the 5 experts divided by the number of experts.

Table 1 and Appendix B1–3 show the ratings of each of the 26 items by the 5 experts. These tables show the i-CVI of each of the items in the constructs and the aggregate mean i-CVI. The aggregate mean CVI as computed have >0.75 for relevance, clarity, simplicity and ambiguity. That is, the questionnaire is content-valid based on the **mean i-CVI** [Relevance = 0.877; Clarity = 0.928; Simplicity = 0.877; Ambiguity = 0.862, calculated as ∑i-CVI/number of items. Hence, based on the mean i-CVI result, no item with i-CVI<0.75 could be removed. Nevertheless, when observed critically, four (4) out of

Table 1. Ratings on a 26 item scale by 5 experts A – E: items rated 3 or 4 on a 4 point *relevance* scale.

Item	Questionnaire items/variables	A	B	C	D	E	No. of Agrmnts	i-CVI	CVRi
1	o Faster tenants' lease up a2	X	X	X	X	-	4	0.80	0.60
2	o Valuation premium a3	X	X	X	X	-	4	0.80	0.60
3	o Better market distinction a4	X	-	X	X	X	4	0.80	0.60
4	o Higher prestige a5	X	X	-	X	X	4	0.80	0.60
5	o Water conservation b1	X	X	X	X	X	5	1.00	1.00
6	o Energy efficiency b2	X	X	X	X	X	5	1.00	1.00
7	o Lower services maintenance costs b3	X	X	X	X	X	5	1.00	1.00
8	o Less claims on medical costs b6	X	X	X	X	-	4	0.80	0.60
9	o Reduced waste water pollution and degradation c1	X	X	X	-	X	4	0.80	0.60
10	o Lower risk of unsustainable resource uses c2	X	X	X	-	X	4	0.80	0.48
11	o Reduced liability risks c3	X	X	X	X	X	5	1.00	1.00
12	o Reduced health and safety risks c4	X	X	X	-	X	4	0.80	0.60
13	o Boosts creativity d1	X	X	X	X	X	5	1.00	1.00
14	o Higher morale d2	X	X	X	X	X	5	1.00	1.00
15	o Improved employee productivity d3	X	X	X	X	X	5	1.00	1.00
16	o Improved indoor quality for staff welfare d4	X	X	X	-	X	4	0.80	0.60
17	o User satisfaction – d5	-	X	-	X	X	3	0.60	0.20
18	o Sustainability provides the future generation needs – f1	X	X	-	X	X	4	0.80	0.60
19	o Less pollution – f2	X	X	X	X	X	5	1.00	1.00
20	o Fight global warming – f3	X	X	X	X	-	4	0.80	0.48
21	o Minimise wastes – f4	X	-	X	X	X	4	0.80	0.60
22	o Invest in Green industrial building rating tools s1	-	X	X	X	X	4	0.80	0.60
23	o Recommend green features to others s3	X	X	X	-	X	4	0.80	0.60
24	The relationship between sustainability and industrial building obsolescence s4	X	X	X	X	X	5	1.00	1.00
25	o Industrial valuation to reflect sustainability s5	X	X	X	X	X	5	1.00	1.00
26	o Would support the cost/ISRO approach where no market exists s7	X	X	X	X	X	5	1.00	1.00
							115		
	Proportion relevant:	0.92	0.92	0.88	0.81	0.85	Mean i-CVI = (∑i- CVI/26 = 22.8/26 = 0.877 Mean expert proportion: 4.34/5 = 0.876		

CVRi = item content validity ratio (Source: this study, 2018)
Mean expert proportion = Mean Expert Agreeing

the five (5) experts agreed to any individual item as relevant (except for item d5), clear, simple (except for items a2, d1, s1) and ambiguity (except for items d1, d2), to count towards the i-CVI.

CV of the overall scale – s-CVI

The most often not reported in the scale development studies is the s-CVI (for the entire scale). s-CVI relies on the ratings by two experts. The s-CVI expresses the proportion of items given a rating of 3 or 4 (quite relevant/highly relevant) by the two expert raters using the 4-point scales of item relevance. In the study, the two experts first agreed that any individual item is relevant for it to count toward the s-CVI. This indicates that all the 26 items were judged to be relevant prima facie. However, the two (2) experts agreed to twenty-one (21) items as quite relevant/highly relevant to count towards the s-CVI. The

Table 2. Computation of an S-CVI for the 26 item scale with 2 Expert raters.

	Expert Rater No. 1		
	Items rated 1 or 2	Items rated 3 or 4	Total
Expert Rater No.2			
Items rated 1 or 2	5	0	5
Items rated 3 or 4	0	21	21
Total	5	21	26
s-CVI = 21/26 = 0.807			

Ratings of 1 = not relevant; 2 = somewhat relevant.
Ratings of 3 = quite relevant; 4 = highly relevant
(Source: this study, 2018)

s-CVI is then computed to be 0.807. Grant & Davis (1992) and Polit & Beck, 2004) have indicated that an s-CVI of .80 or higher is acceptable. Table 2 shows the result:

Hence, the s-CVI of 0.807 could be accepted because 0.807 is higher than 0.80.

Lawshe's CVR

CVR = (n_e – N/2)/(N/2) where CVR = content validity ratio, n_e = number of experts indicating "essential", N = total number of experts (5). The individual item CVR ranges from 0.20 to 1.00 (see Table 1) calculated as follows:

$$CVRi = item\,CVR,\ n_e = 5,\ CVRi = (5 - 5/2)/2.5 = 1.00.\ If\ n_e = 4,\ CVRi = 0.60,\ and\ n_e\ at\ 3, CVRi = 0.2$$

The indication of the positive values of 0.2, 0.60, 1.00 is that, at least 50% of the experts rated the items as essential.

The mean CVR (across items) is calculated thus:

$$CVRm = Mean\,CVR, n_e = (115/26 = 4.23 - see\ Table1).\ CVRm = (4.23 - 5/2)/(5/2) = 4.23 - 2.5/2.5 = 1.73/2.5 = +0.692.$$

The indication of positive (+0.692) is the evidence of overall content validity. Furthermore, +0.692 informed that this study could employ a minimum of 5 experts, based on the critical values for Lawshe's content validity ratio and the Mean Proportion Agreeing (0.876 – see Table 1) (Ayre & Sally, 2014; Wilson et al., 2012).

Table 3 shows the description of the findings with respect to the examination of the relevance, clarity, simplicity, and ambiguity of the questions used for each dimension of the construct.

The average i-CVI is calculated as the summation of all the i-CVIs within a construct divided by the number of items. For instance, the average i-CVI for *a2-a5* on relevance is calculated as 0.8 + 0.8 + 0.8 + 0.8 = 3.2/4 = 0.80 (see Table 1). The average i-CVI for *a2-a5* on clarity is calculated as 1.0 + 1.0 + 1.0 + 1.0 = 4.0/4 = 1.0 (see Appendix B1). Similar calculations are carried for the items in each of the other constructs,

Table 3 further shows that items *a2* to *a5* are relevant to the BHBV construct (*average* i-CVI = 0.80), absolutely clear in its representation, at 1.0 The are quite simple to understand (0.80). The items are not ambiguous (0.80). Items *b1* to *b3, b6* in the BCS construct are relevant (0.90). The items show sufficient clarity in its representation (0.928), are quite simple to understand (0.94), and not ambiguous (0.80). The BLR construct, with items *c1*

Table 3. Constructs and items showing the average i-CVI.

Constructs/items	Relevance	Clarity	Simplicity	ambiguity
BHBV Items a2-a5	0.80	1.0	0.80	0.80
BCS Items b1-b3	0.90	0.928	0.94	0.80
BLR Items c1-c4	0.825	0.825	0.75	0.825
BPG Items d1-d5	0.89	0.92	0.92	0.80
BQL Items f1-f4	0.85	0.85	0.85	0.85
SUP Items s1,s3-s5, s7	0.92	0.80	0.88	0.92

to *c4*, are relevant to the BLR construct (with an average i-index of 0.825. The items show clarity in its representation (0.825). fairly simple to understand (with an average i-index of 0.75, and are not ambiguous (0.825). Items *d1* to *d5*) are relevant to the BPG construct (with an average i-index of 0.89. The items show sufficient clarity in its representation (0.92), quite simple to understand (0.92), and not ambiguous (0.80). Items *f1 to f4* in the BQL construct are relevant (0.85). The items show sufficient clarity in its representation (0.85), are quite simple to understand (0.85), and not ambiguous (0.85). Items s*1, s3-s5, s7* in the SUP construct are relevant (0.92). The items show sufficient clarity in its representation (0.80), quite simple to understand (0.88), and not ambiguous (0.92).

However, items a2, c3, d1, d2, d5, s1 are identified as weak items in the content representativeness of the constructs, each scoring 0.60 < 0.78 (d5 on relevance, a2, c3, d1 and s1 on simplicity, d1, d2 on ambiguity). d1 recurs on relevance and ambiguity. The s-CVI stage also rated the 5 items at 1 or 2, indicating their removal. The 5 items were removed accordingly. The content-valid scale is presented in Table 4 as shown below:

At the i-CVI stage, none of the 5 items was removed because of the aggregated mean i-CVI >0.75 in all cases. However, at the level of s-CVI, the 5 items were removed leaving 21 items distributed as shown in Table 3.

Discussion and implications

The research problems have been addressed by reporting both CVIs and providing detailed information on the indices. Furthermore, it fulfils all the objectives of the study by accomplishing tasks 1–4 in its investigation. In this regard, the questions raised about the relevance, clarity, simplicity, and ambiguity of the questionnaire items/variables used for each dimension of a construct, the coding criteria, the number of dimensions and measures of a construct as well as the scales used have been answered. López et al. (2014) held that the psychometric properties of the questionnaire scale should be tested before an overall assessment of scale validity can be made. This work agrees with Polit and Beck (2004) that it is pertinent to distinguish between content validity at the item level and the scale level. The two acronyms distinguish the two (i-CVI and s-CVI).

On a larger scale, the methodological approach purports to act as a guide for researchers who wish to explore content representations in greater detail for confidence in their measurement procedure and to enhance the construct validity of their work. It does this by showing

Table 4. Content-valid items/variables and items/variables removed.

Constructs	Content-valid Items/variables	Items/variables removed
High Building Value (BHBV)	Valuation premium a3, Better market distinction a4, Higher prestige a5.	**Faster tenants' lease up a2**
Cost Savings (BCS)	Water conservation b1, Energy efficiency b2, Lower services maintenance costs b3, Fewer claims on medical costs b6	None removed
Lower Risks (BLR)	Reduced wastewater pollution and degradation c1, Lower risk of unsustainable resource uses c2, Reduced health and safety risks c4	**Reduced liability risks c3**
Productivity Gains (BPG)	Higher morale d2, Improved employee productivity d3, Improved indoor quality for staff welfare d4,	**Boosts creativity d1 User satisfaction – d5**
Quality of Life (BQL)	Sustainability provides the future generation needs – f1, Less pollution – f2, Fight global warming – f3, Minimise wastes – f4	None removed
Support (SUP)	Recommend green features to others s3, The relationship between sustainability and industrial building obsolescence s4, Industrial valuation to reflect sustainability s5, Would support the cost/ISRO approach where no market exists s7	**Invest in Green industrial building rating tools s1**

evidence of what is to be measured and reported. The results obtained from the panel of experts were useful for the design and the structure of the final instrument that was used (Table 2). The final instrument supports the requirement for content validation as a relevant aspect of questionnaire construction and a useful model study. Nonetheless, the research was enriched by the comments taken from the panel of experts. The results support some of the data of the previous studies by Addae-Dapaah et al. (2009) that pointed out to knowledge about the potential benefits of sustainability to gather support for implementation in the valuation process. Hence, it might be useful to consider KM and HRM as significant elements of valuers' support system. At the same time, considering that in the current context, there is an increase in concern about sustainability, the internal validity may well be tested. The success of sustainability in property valuation presupposes a deep understanding of the perceived benefits to meet the requirement for responsible valuation of which the CV of the questionnaire design is an indispensable part.

The sample of items for the constructs measured adequately represents the domain of the content addressed by the instrument. The sample items, taken together, constitute an adequate operational definition of the constructs. Nevertheless, it seems likely that the more experts included, the greater the likelihood that the s-CVI would decrease as more divergent scores could emerge (Polit & Beck, 2006). This elicits probable volatility in the outcome due to inflated agreements and disagreements due to chance. For 2 experts, the probability of chance disagreement on a dichotomous rating of relevance is .500; this is analogous to the odds of getting one head and one tail (i.e., disagreement) in a 2-coin toss. In a 6-rater situation, the probability of at least one chance disagreement on dichotomous relevance ratings is .968. This is analogous to the probability of getting at least one head or one tail (disagreement) in a 6-coin toss. The probability that all raters would agree on relevance, and on irrelevance, is.5N, where N¼the number of raters. Hence, it is not desirable to use more experts/raters. The mean CVR represented by +0.692 would mean that none of the 21 items needs to be removed, revised further or substituted as the case may be.

Limitations

The work does not claim to be definitive such that result generalisation might be easy to propose. It is quite possible for the CVI to produce a different index from other methods such as the multi-rater kappa. For instance, Wynd et al. (2003) argued that the formula for Kappa yields an index of the degree of agreement beyond chance agreement, unlike the CVI, which does not adjust for chance agreement. Furthermore, the CVI shrinks information by collapsing experts' ordinal rating of 4 scales into 2 scale categories of relevant/not relevant. Moreover, the CVI focuses on item relevance and does not appear to capture whether a scale includes a comprehensive set of items that measure the construct of interest.

Conclusion

The study defined and calculated the CVI and found considerable consistency for the i-CVI while the s-CVI accounts for the universal agreement among the two experts. The result of the CV underscores the scale's quality as the observation truly fit the content categories stated test specification.

The study questionnaire is content-valid based on s-CVI, having been scored ≥0.75 on the item and > 0.80 on the overall scale basis. No item scored below 0.75 for i-CVI and 0.80 for s-CVI. The CVR and the Mean Proportion Agreeing evidenced the overall content validity. Hence, the observations truly fit the content categories. Also, the relevance of CV to all the elements of an assessment instrument that affect the obtained data, including item content instructions, behaviour codes, and scoring is assured. The instrument elements affect the obtained data, the extent to which the field data can be assumed to be part of the targeted construct and the judgments that can be based on it. Nevertheless, the specific CV elements could differ in relevance across assessment methods. Research seldom reports CV in clear terms, whereas researchers should report item and scale CVIs with a panel of experts to minimise the possibilities of chance agreements or disagreements.

Future work would be to investigate the number of ways that constructs can be operationally defined in terms of the number of dimensions and measures of a construct and the potential for constructs to overlap and become indiscriminate.

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ORCID

Abiodun Jogunola http://orcid.org/0000-0003-4642-8136

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APPENDICES

APPENDIX A. Criteria for measuring content validity

A. RELEVANCE

1. = not relevant
2. = somewhat relevant (item needs some major revision)
3. = quite relevant (relevant but needs minor revision)
4. = highly or very relevant

B. CLARITY

1. = not clear
2. = item needs some major revision.
3. = clear but needs minor revision)
4. = very clear

C. SIMPLICITY

1. = not simple
2. = item needs some major revision.
3. = simple but needs a minor revision
4. = very simple

D. AMBIGUITY

1. = doubtful
2. = item needs some revision
3. = no doubt but needs a minor revision
4. = meaning is clear

Yaghmale (2003) and (Waltz et al., 2005)

APPENDIX B.

1. Ratings on a 26 item scale by 5 Experts: Items rated 3 or 4 on a 4 point *CLARITY* Scale

Item	Questionnaire	A	B	C	D	E	No. of Agreements	i-CVI
1	o Faster tenants' lease up a2	X	X	X	X	X	5	1.00
2	o Valuation premium a3	X	X	X	X	X	5	1.00
3	o Better market distinction a4	X	X	X	X	X	5	1.00
4	o Higher prestige a5	X	X	X	X	X	5	1.00
5	o Water conservation b1	X	X	X	X	X	5	1.00
6	o Energy efficiency b2	X	X	X	X	X	5	1.00
7	o Lower services maintenance costs b3	X	X	X	X	X	5	1.00
8	o Less claims on medical costs b6	X	X	X	X	-	4	0.80
9	o Reduced waste water pollution and degradation c1	X	X	X	-	X	4	0.80
10	o Lower risk of unsustainable resource uses c2	X	X	X	-	X	4	0.80
11	o Reduced liability risks c3	X	X	X	X	X	5	1.00
12	o Reduced health and safety risks c4	X	X	X	-	X	4	0.80
13	o Boosts creativity d1	X	X	X	X	X	5	1.00
14	o Higher morale d2	X	X	X	X	X	5	1.00
15	o Improved employee productivity d3	X	X	X	X	X	5	1.00
16	o Improved indoor quality for staff welfare d4	X	X	X	-	X	4	0.80
17	o User satisfaction – d5	X	X	-	X	X	4	0.80
18	o Sustainability provides the future generation needs – f1	X	X	-	X	X	4	0.80
19	o Less pollution – f2	X	X	X	X	X	5	1.00
20	o Fight global warming – f3	X	X	X	X	-	4	0.80
21	o Minimise wastes – f4	X	-	X	X	X	4	0.80
22	o Invest in Green industrial building rating tools s1	X	X	-	X	X	4	0.80
23	o Recommend green features to others s3	X	X	X	-	X	4	0.80
24	The relationship between sustainability and industrial building obsolescence s4	X	X	X	-	X	4	0.80
25	o Industrial valuation to reflect sustainability s5	X	X	X	-	X	4	0.80

(*Continued*)

(Continued).

Item	Questionnaire	A	B	C	D	E	No. of Agreements	i-CVI
26	o Would support the cost/ISRO approach where no market exists s7	X	X	X	X	-	4	0.80
	Proportion relevant:	1.00	0.96	0.88	0.73	0.88	Mean i-CVI = ∑i-CVI/26: 23.2/26 = 0.928	
							Mean expert proportion: 4.45/5 = 0.890	

(Source: this study, 2018)

2. Ratings on a 26 item scale by 5 Experts: Items rated 3 or 4 on a 4 point *SIMPLICITY* Scale

Item	Questionnaire	A	B	C	D	E	No. of Agreements	i-CVI
1	o Faster tenants' lease up a2	X	X	X	-	-	3	0.60
2	o Valuation premium a3	X	X	X	X	-	4	0.80
3	o Better market distinction a4	X	-	X	X	X	4	0.80
4	o Higher prestige a5	X	X	X	X	X	5	1.00
5	o Water conservation b1	X	X	X	X	X	5	1.00
6	o Energy efficiency b2	X	X	X	X	X	5	1.00
7	o Lower services maintenance costs b3	X	X	X	X	X	5	1.00
8	o Less claims on medical costs b6	X	X	X	X	-	4	0.80
9	o Reduced waste water pollution and degradation c1	X	X	X	-	X	4	0.80
10	o Lower risk of unsustainable resource uses c2	X	X	X	-	X	4	0.80
11	o Reduced liability risks c3	-	X	X	X	-	3	0.60
12	o Reduced health and safety risks c4	X	X	X	-	X	4	0.80
13	o Boosts creativity d1	-	-	X	X	X	3	0.60
14	o Higher morale d2	-	-	X	X	X	5	1.00
15	o Improved employee productivity d3	X	X	X	X	X	5	1.00
16	o Improved indoor quality for staff welfare d4	X	X	X	X	X	5	1.00
17	o User satisfaction – d5	X	X	-	X	X	5	1.00
18	o Sustainability provides the future generation needs – f1	X	X	-	X	X	4	0.80
19	o Less pollution – f2	X	X	X	X	X	5	1.00
20	o Fight global warming – f3	X	X	X	X	-	4	0.80
21	o Minimise wastes – f4	X	-	X	X	X	4	0.80
22	o Invest in Green industrial building rating tools s1	X	X	-	X	-	3	0.60
23	o Recommend green features to others s3	X	X	X	-	X	4	0.80
24	The relationship between sustainability and industrial building obsolescence s4	X	X	X	X	X	5	1.00
25	o Industrial valuation to reflect sustainability s5	X	X	X	X	X	5	1.00
26	o Would support the cost/ISRO approach where no market exists s7	X	X	X	X	X	5	1.00
	Proportion relevant:	0.96	0.92	0.88	0.81	0.77	Mean i-CVI: 22.8/26 = 0.877	
							Mean expert proportion: 4.34/5 = 0.868	

(Source: this study, 2018)

3. Ratings on a 26 item scale by 5 Experts: Items rated 3 or 4 on a 4 point *AMBIGUITY* Scale

Item	Questionnaire	A	B	C	D	E	No. of Agreements	i-CVI
1	o Faster tenants' lease up a2	X	X	X	X	-	4	0.80
2	o Valuation premium a3	X	X	X	X	-	4	0.80
3	o Better market distinction a4	X	-	X	X	X	4	0.80
4	o Higher prestige a5	X	X	-	X	X	4	0.80
5	o Water conservation b1	X	X	X	X	X	5	1.00
6	o Energy efficiency b2	X	X	X	X	X	5	1.00
7	o Lower services maintenance costs b3	X	X	X	X	X	5	1.00
8	o Less claims on medical costs b6	X	X	X	X	-	4	0.80
9	o Reduced waste water pollution and degradation c1	X	X	X	-	X	4	0.80
10	o Lower risk of unsustainable resource uses c2	X	X	X	-	X	4	0.80
11	o Reduced liability risks c3	X	X	X	X	X	5	1.00
12	o Reduced health and safety risks c4	X	X	X	-	X	4	0.80
13	o Boosts creativity d1	-	-	X	X	X	3	0.60
14	o Higher morale d2	-	-	X	X	X	3	0.60
15	o Improved employee productivity d3	X	X	X	X	X	5	1.00
16	o Improved indoor quality for staff welfare d4	X	X	X	-	X	4	0.80
17	o User satisfaction – d5	X	X	X	X	X	4	1.00
18	o Sustainability provides the future generation needs – f1	X	X	-	X	X	4	0.80
19	o Less pollution – f2	X	X	X	X	X	5	1.00
20	o Fight global warming – f3	X	X	X	X	-	4	0.80
21	o Minimise wastes – f4	X	-	X	X	X	4	0.80
22	o Invest in Green industrial building rating tools s1	X	X	-	X	X	4	0.80
23	o Recommend green features to others s3	X	X	X	-	X	4	0.80
24	The relationship between sustainability and industrial building obsolescence s4	X	X	X	X	X	5	1.00
25	o Industrial valuation to reflect sustainability s5	X	X	X	X	X	5	1.00
26	o Would support the cost/ISRO approach where no market exists s7	X	X	X	X	X	5	1.00
	Proportion relevant:	0.92	0.85	0.88	0.81	0.85	Mean i-CVI: 22.4/26 = 0.862 Mean expert proportion = 4.31/5 = 0.862	

(Source: this study, 2018)