

Content validation and content validity index calculation for entrepreneurial behavior instruments among vocational college students in China



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Abstract This paper aims to assess entrepreneurial behavior among vocational college students in China with a valid measurement, the content validity index (CVI). Content validity is essential for substantiating the accuracy of an assessment tool such as questionnaires, particularly in the context of research. In this process, content validity was ensured through use of an expert panel approach comprising five individuals with expertise in the studied field. Therefore, vocational college students' entrepreneurial behavior, which consists of entrepreneurial activities, overcoming failure, and proactive behavior, was analyzed and tested using CVI. This research included five expert panels in the field of entrepreneurial education in China, and a 4-point relevance rating scale that has already been proven to have high efficacy was used in this study. There are two types of CVIs, the Scale-level Content Validity Index (S-CVI) and the Item-level Content Validity Index (I-CVI). Items scoring less than 1.00 on the I-CVI or less than 0.9 on the S-CVI were removed. The researcher found that the constructs of entrepreneurial behavior, including entrepreneurial activities, overcoming failure, and proactive behavior, demonstrated strong content validity in assessing the extent of entrepreneurial behavior among vocational college students in China. After this stage, further research on construct validity and reliability tests with the current scale is recommended. The results further confirm its suitability, indicating that this scale is applicable for researchers exploring studies that focus on entrepreneurial behavior within the context of vocational colleges.

Keywords: content validation, content validity index, entrepreneurial behavior, instrument, vocational college students

1. Introduction

The global recognition of the effectiveness of different sectors in promoting entrepreneurial behavior is highly valued (Pidduck et al., 2023). Milanese (2018) asserted that by consistently demonstrating entrepreneurial behavior, steadfastly pursuing defined goals, and investing additional time and energy, entrepreneurs can achieve successful entrepreneurship and reap economic rewards. In the context of the college environment, entrepreneurship has garnered considerable attention, possibly because of its ability to equip aspiring entrepreneurs in practical aspects of this endeavor (Nowiński et al., 2019). Liao and Maulana Suprpto (2023) indicated that entrepreneurial behavior significantly influences college students' dynamic capabilities, affecting their capacity to recognize market trends, capitalize on strategic collaboration opportunities, and adapt processes for generating knowledge.

Entrepreneurial behavior encompasses diverse components such as innovation, proactivity, risk-taking, competitiveness, and independence (Zellweger & Sieger, 2012). De Jong and Den Hartog (2010) developed a multidimensional scale that incorporates four distinct entrepreneurial behaviors: concept creation, exploration, advocacy, and execution. McGee et al. (2009) argued that entrepreneurial behavior can be divided into four subdimensions: key milestones, development, overcoming failure, and disappointment. Ouni and Boujelbene (2023) used a questionnaire consisting of nine items, consistently affirming the idea that entrepreneurial behavior involves the execution of various entrepreneurial activities, to assess the entrepreneurial behavior of college graduates. Nevertheless, there is a lack of consensus on which instruments should be utilized to measure entrepreneurial behavior among vocational college students in China. Several global studies have recently focused on entrepreneurial behavior, including research mainly on university students in the Visegrád countries (Nowiński et al., 2019), Hammond (2019) in Northeast Asia, and Ouni and Boujelbene (2023) in Africa.

In the context of China, the influencing factors of entrepreneurial behavior on college students can be identified by the entrepreneurial social atmosphere, entrepreneurial policies, and entrepreneurial education (Duan, 2022). Liao and Maulana Suprpto (2023) found that entrepreneurial behaviors can have a substantial impact on a college's dynamic capabilities, encompassing the ability to perceive market trends, seize strategic collaboration opportunities, and adapt



knowledge-generation processes. Furthermore, in recent years, a growing number of scholars have focused on entrepreneurial behavior, encompassing three subdimensions: proactive behavior, innovative behavior, and risk-taking behavior (Anderson et al., 2019; Edú Valsania et al., 2016; Escrig-Tena et al., 2022; Razavi & Ab Aziz, 2017). However, as mentioned by Anderson et al. (2015), innovation and proactivity are inherently connected, serving as functionally equivalent expressions of the underlying dimension of entrepreneurial behaviors. This indicated that they concentrated on either proactive behavior or innovative behavior, along with risk-taking behavior.

In addition, risk-taking behavior is strongly related to an entrepreneur's willingness to accept failure and his or her tendency to pursue actions with the potential for both positive outcomes and possible losses in the event of unsuccessful results (Edú Valsania et al., 2016). This implies a convergence of risk-taking behaviors and dimensions of overcoming failure. A commonly used scale developed by Shirokova et al. (2016) was employed in many previous studies to measure college students' entrepreneurial behavior based on the unidimensionality of entrepreneurial activities (Li et al., 2020; Neneh, 2019; Ouni & Boujelbene, 2023). Therefore, this research tended to focus on three dimensions of entrepreneurial behavior in the context of vocational college students in China: proactive behavior, overcoming failure, and entrepreneurial activities.

However, previous research has mainly concentrated on factors affecting entrepreneurial intention, neglecting the consideration of behavioral factors (Cui et al., 2021; Fu et al., 2022; Wu & Tian, 2022). The reason is the protracted nature of entrepreneurial behavior as an objective indicator, which underscores the need for a suitable measurement approach (Sherkat & Chenari, 2022). Hence, it is imperative to identify a suitable approach for measuring entrepreneurial behavior.

The present research seeks to modify and validate an instrument for evaluating entrepreneurial behavior among vocational college students in China. The instruments assessing entrepreneurial behavior constructs, which encompass dimensions of entrepreneurial activities, overcoming failure, and proactive behavior, were adapted and subsequently distributed to five expert panels for content validity assessment. The experts were asked to evaluate the instruments using the CVI through a 4-point relevance rating scale developed by Davis (1992). This research contends that entrepreneurial behavior is a multidisciplinary concept with several dimensions and instruments. Validating these measures is essential for comprehensively understanding their interrelationships.

2. Materials and methods

Content validity pertains to how accurately a measurement captures the concept that seeks to be assessed (Sekaran & Bougie, 2013). As mentioned by Polit and Beck (2006), determining content validity primarily relies on judgment and involves two different stages. The scale's originator initially strives to boost content validity by undertaking domain analysis and careful conceptualization before formulating items. After this stage, additional efforts are made to evaluate the scale's content validity via expert evaluation. Therefore, entrepreneurial behavior, which consists of entrepreneurial activities, overcoming failure, and proactive behavior, was analyzed and tested using CVI. The procedure for content validation in this study has six steps based on Yusoff (2019). These stages include (1) drafting the content validation form, (2) choosing a panel of experts for review, (3) performing content validation, (4) examining items and domains, (5) assigning scores to items, and (6) calculating the CVI.

2.1. Drafting the content validation form

Each expert reviewer should possess a functional understanding of the research, encompassing definitions, hypotheses to be examined, and the overall objectives for instrument utilization. A review of the instrument may become disjointed or misguided if expert reviewers are not familiar with the conceptual foundation of the study (Davis, 1992). This is why the content validity form is compulsory. The relevance rating scale endorsed by Davis (1992) was employed to assess content validity in the current research. The researcher prepared the validation form including the research purpose, definition, and measurement of the scale, for the expert reviewers, as shown in Figure 1.

<p>Assessment Guide of Content Validation</p> <p>This inventory consists of entrepreneurial behavior with three dimensions, entrepreneurial activities, overcoming failure, and proactive behavior among vocational college students in China. The items of the instrument will be provided on a 7-Likert Scale ranging from 1 strongly disagree to 7 strongly agree the respondents after this process. Kindly offer an expert evaluation of the relevance of each item to the specified domains being measured. The evaluation should rely on the definitions and pertinent terminology outlined in the text. Please aim for objectivity and constructive comments in your review, utilizing the provided relevance rating scale.</p> <p>Degree of relevance:</p> <p>1 = The item does not pertain to the measured domain</p> <p>2 = The item is moderately related to the measured domain</p> <p>3 = The item is highly relevant to the measured domain</p> <p>4 = The item is extremely relevant to the measured domain</p>

Figure 1 Content Validation Evaluation.

Apart from the assessment criteria, this study addresses entrepreneurial behavior among vocational college students in China, encompassing three dimensions: entrepreneurial activities, overcoming failure, and proactive behavior. The instrument to measure students' entrepreneurial behavior was adapted from Escrig-Tena et al. (2022); Osofsky (2019); and Shirokova et al. (2016). All the items are shown in Table 1, which includes 10 items (EB1 to EB10) from Shirokova et al. (2016), 7 items (EB11 to EB17) from Osofsky (2019), and 7 items (EB18 to EB24) from Escrig-Tena et al. (2022).

Table 1 Form for content verification that represents the measured constructs.

Code	Tested items	Expert's Consent Level				Expert Comments
Entrepreneurial activities						
EB1	I know how to discuss product or business idea with potential customers, and I have tried in my entrepreneurial projects	1	2	3	4	
EB2	I know how to collect information about markets or competitors, and I have attempted in my entrepreneurial projects	1	2	3	4	
EB3	I can write a good business plan	1	2	3	4	
EB4	I have initiated the development of products/services within my entrepreneurial programs	1	2	3	4	
EB5	I have initiated marketing or promotional activities within my entrepreneurial programs	1	2	3	4	
EB6	I have procured equipment or materials related to my entrepreneurial programs	1	2	3	4	
EB7	I have attempted to obtain financial support from others	1	2	3	4	
EB8	I can apply a patent, copyright, or trademark for my entrepreneurial projects	1	2	3	4	
EB9	I am able to register my company	1	2	3	4	
EB10	I will try to sell products or services	1	2	3	4	
Overcoming failure						
EB11	I will look for new investors in the event of a setback	1	2	3	4	
EB12	I will make adjustments to the plan in the event of failure	1	2	3	4	
EB13	I won't give up in the face of setbacks	1	2	3	4	
EB14	I will explore other opportunities if I encounter failure	1	2	3	4	
EB15	I will devise fresh approaches to tackle challenges in case of failure	1	2	3	4	
EB16	I will seek advice from others when encountering failure	1	2	3	4	
EB17	I will devise solutions to overcome challenges when I encounter failure	1	2	3	4	
Proactive behavior						
EB18	I actively tackle problems	1	2	3	4	
EB19	Whenever something goes wrong, I immediately search for a solution	1	2	3	4	
EB20	Whenever there is a chance to get actively involved, I take it	1	2	3	4	
EB21	I proactively take the lead without hesitation, even others may not	1	2	3	4	
EB22	I seize opportunities promptly to achieve my objectives	1	2	3	4	
EB23	I usually do more than I am asked to do	1	2	3	4	
EB24	I am good at in generating ideas, especially in regard to creativity	1	2	3	4	

Note(s): EB = Entrepreneurial Behavior.

2.2. Choosing a panel of experts for review

Considering that the respondents in this study were vocational college students in China, this research employed five experts from three vocational colleges in China. The criteria for choosing experts include having relevant work experience in the same field (Rubio et al., 2003). The experts were required to meet specific criteria, including holding a master's degree, having the rank of associate professor, and possessing significant experience in the field of entrepreneurial education. An expert panel is designed to assess the components of the instrument and assign ratings according to their relevance and representation within the content domain (Davis, 1992). Panel experts are asked to evaluate the clarity and relevance of instrument items concerning the underlying construct by the definitions of the construct and its dimensions, using a 4-point ordinal scale. The details of the experts for assessing students' entrepreneurial behavior are outlined in Table 2.

Table 2 Relevance of objectives of teaching subjects at the university.

No	Domain expert	Organization	Experience
1	Doctor and Professor	Shandong Institute of Commerce and Technology	20 years
2	Associate Professor	Linyi Vocational College	13 years
3	Associate Professor	Shandong Drug and Food Vocational College	12 years
4	Associate Professor	Shandong Institute of Commerce and Technology	16 years
5	Professor	Shandong Institute of Commerce and Technology	28 years

Note(s): Experience in this study refers to the years engaged in entrepreneurial education.

2.3. Performing content validation

This study adhered to a synchronous content validity approach by providing experts with a preprepared form for their evaluation. As mentioned by Yusoff (2019), the non-face-to-face method proves highly effective when there is a well-organized follow-up system in operation to enhance both the response rate and efficiency during expert validation. In the initial stage of this study, the researcher provided an invitation letter to evaluate the instrument via email and WeChat. Upon consenting to undertake the review, the researcher furnished a cover letter that was combined with the evaluation form for students' entrepreneurial behavior. The email also needs to include a comprehensive explanation for the review, scoring, and evaluation of the instruments (Davis, 1992).

2.4. Examining items and domain

According to Yusoff (2019), the experts should be assigned the responsibility of comprehensively assessing both the items and their domain before assigning scores to each item. They are urged to provide either verbal or written feedback to improve the relevance of items to the specified domain. Every comment received is carefully considered during the refinement of both the domain and its respective items. The researcher provided contact numbers and email addresses to minimize the likelihood of any misunderstandings during the completion of the evaluation form.

2.5. Assigning scores to items

Five experts were solicited for their subjective assessments of the instruments and sent to the researcher once they were. After that, the researcher provided the survey form and comment form to the expert panel for the upcoming session. All members of the expert panel were tasked with evaluating the relevance and clarity of the indicators employed in the study instrument using the scoring technique depicted in Figure 1, along with offering open comments in the specific form as shown in Table 1. Based on the criteria of Davis (1992), if the result of the relevance scale is 1 or 2, it can be recorded as 0, or if the relevance scale's result is 3 or 4, it can be regarded as 1. This indicates that a rating of 3 to 4 is considered the appropriate item.

2.6. Calculating the CVI

Lynn (1986) stated that many researchers calculate two categories of CVIs to assess research objectives. The first is the I-CVI, which is calculated by assessing the percentage of experts assigning a rating of 3 or 4 and dividing this by the overall number of experts (Polit & Beck, 2006). The second type relates to the S-CVI, which represents the percentage of items in an instrument receiving a rating of either 3 or 4 from a total number of content experts (Polit et al., 2007). Polit et al. (2007) presented widely acknowledged guidelines regarding the acceptable I-CVI concerning the number of experts. They recommended that when the panel has three to five experts, the threshold of the I-CVI is 1.00, signifying unanimous agreement among all experts on the content validity of the item. Therefore, any item with an I-CVI value below 1.00 needed to be removed from this questionnaire because this study employed five experts. Table 3 outlines the criteria for the acceptable cutoff value.

Table 3 Comparison between total exports and the cutoff value.

Number of experts	Acceptable CVI	References
3 to 5 experts	Should be 1	Polit et al. (2007)
At least 6 experts	A minimum of 0.83	Polit et al. (2007)
6 to 8 experts	A minimum of 0.83	Lynn (1986)
More than 8 experts	A minimum of 0.78	Lynn (1986)

3. Findings and Discussion

This research explored the validity of three dimensions of entrepreneurial behavior among vocational college students in China: entrepreneurial activities, overcoming failure, and proactive behavior. Agreement on an item among the experts was established by consolidating the assessment scores given by all the experts for that particular item. The I-CVI is calculated using the formula I-CVI and can be calculated by agreed-upon items divided by several experts (Polit & Beck, 2006). The S-CVI is the total I-CVI score (Polit et al., 2007). There are two approaches for calculating the S-CVI: the S-CVI/UA (universal agreement), which has a minimum reasonable value of .80 (Davis, 1992), and the S-CVI/Ave, which has a minimum reasonable value of .90 or higher (Polit et al., 2007). Polit and Beck (2006) suggested that the S-CVI/Ave method is better because the universal agreement is excessively stringent, especially in the presence of a sizable number of experts on the validation panel. In detail, the experts' evaluations are presented in Table 4, Table 5, and Table 6.

Table 4 The relevance rating on the scale of the item for entrepreneurial activities.

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert in Agreement	I-CVI	UA
EB1	1	1	1	1	1	5	1	1
EB2	1	1	1	1	1	5	1	1
EB3	1	1	1	1	1	5	1	1
EB4	1	1	1	1	1	5	1	1
EB5	1	1	1	1	1	5	1	1
EB6	1	1	1	1	1	5	1	1
EB7	1	1	1	1	1	5	1	1
EB8	1	1	1	1	0	4	0.8	0
EB9	1	1	1	1	1	5	1	1
EB10	1	1	1	1	1	5	1	1
					0.9	S-CVI/Ave	0.98	
						S-CVI/UA		0.9
Proportion relevance: Average proportion of items judged as relevant across the five experts						0.98		

Note(s): I-CVI = agreed-upon/number of experts; UA = universal agreement; S-CVI = the sum of the I-CVI

Table 5 The relevance rating on the scale for overcoming failure.

Item	Expert1	Expert 2	Expert 3	Expert4	Expert5	Expert in Agreement	I-CVI	UA
EB11	1	1	1	1	1	5	1	1
EB12	1	1	1	1	1	5	1	1
EB13	1	1	1	1	1	5	1	1
EB14	1	1	1	1	1	5	1	1
EB15	1	1	1	1	1	5	1	1
EB16	1	1	1	1	1	5	1	1
EB17	1	1	1	1	1	5	1	1
						S-CVI/Ave	1	
						S-CVI/UA		1
Proportion relevance: Average proportion of items judged as relevant across the five experts						1		

Note(s): I-CVI = agreed-upon/number of experts; UA = universal agreement; S-CVI = the sum of the I-CVI

Table 6 The relevance rating on the scale of the item for proactive behavior.

Item	Expert1	Expert 2	Expert 3	Expert4	Expert5	Expert in Agreement	I-CVI	UA
EB18	1	1	1	1	1	5	1	1
EB19	1	1	1	1	1	5	1	1
EB20	1	1	1	1	1	5	1	1
EB21	1	1	1	1	1	5	1	1
EB22	1	1	1	1	1	5	1	1
EB23	1	1	1	1	1	5	1	1
EB24	1	1	1	1	1	5	1	1
						S-CVI/Ave	1	
						S-CVI/UA		1
Proportion relevance: Average proportion of items judged as relevant across the five experts						1		

Note(s): I-CVI = agreed-upon/number of experts; UA = universal agreement; S-CVI = the sum of the I-CVI

As illustrated in Table 4, Table 5, and Table 6, students' entrepreneurial behavior was calculated in three dimensions: entrepreneurial activities, overcoming failure, and proactive behavior. The evaluation showed that both the S-CVI/Ave and S-CVI/UA above 0.90 met the criterion requirements; thus, the scale reached the desired level of content validity. However, only one item (EB8) needs to be deleted since the I-CVI score is under the threshold of 1.00. After deleting this item, the I-CVI also reached a satisfactory level. This means that the constructs of entrepreneurial behavior, including entrepreneurial activities, overcoming failure, and proactive behavior, demonstrated strong content validity in assessing the extent of entrepreneurial behavior among vocational college students in China.

Ensuring the overall validity of an assessment is highly important, and content validity plays a crucial role in this regard. This research presented an evidence-based and systematic method for performing a thorough content validation. Empirical data from expert scores in the assessment of entrepreneurial behavior among vocational college students in China have been demonstrated as the basis for calculating CVI using this instrument, providing a foundation for subsequent

research. Furthermore, after this stage of expert evaluation, future research should employ EFA to explore the reliability and validity of the instrument that was measured in the current study.

While this study has made valuable contributions, it is essential to acknowledge its limitations. First, entrepreneurial behavior is dynamic, requiring periodic updates to research instruments. This study focused only on three dimensions of entrepreneurial behavior: entrepreneurial activities, overcoming failure, and proactive behavior, and future studies may explore additional dimensions. Geographically, the current study specifically involved experts from vocational colleges within Shandong Province, China, which limits its generalizability. Subsequent research could incorporate participants from both universities and colleges, extending the study to diverse regions. Additionally, relying solely on a self-administered online survey in this study may have led to certain biases. Future investigations might benefit from a hybrid approach, combining online and offline self-administered surveys for a more comprehensive understanding. Finally, as this study exclusively involved vocational college students in one country, further research could broaden its scope to include college students from different countries and consider cultural variations.

4. Final considerations

This study was utilized to evaluate an instrument for measuring entrepreneurial behavior among vocational college students. This research confirms the appropriateness of most items for measuring entrepreneurial behavior across three dimensions: entrepreneurial activities, overcoming failure, and proactive behavior. The study findings indicate the validity of the entrepreneurial behavior scale, as affirmed through the calculation of CVI. This study has valuable implications by enriching the literature on entrepreneurial behavior, particularly within the context of vocational colleges in China, where previous research lacked a focus on these dimensions. Furthermore, the study provides future researchers in entrepreneurial behavior with valuable instruments, enhancing the likelihood of obtaining superior data characterized by higher validity and reliability.

Ethical considerations

This research was approved by the Research Ethics Committee of Universiti Kebangsaan Malaysia (Approval Ref: JEP-2024-122).

Conflict of Interest

The authors declare no conflicts of interest.

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