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Context-specific entrepreneurial environment scale: a psychometric analysis

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ABSTRACT

The entrepreneurial environment has a significant impact on entrepreneurial motivations. In the Philippines, where entrepreneurship and innovation are gaining momentum, an increasing number of individuals are embarking on an entrepreneurial journey. However, despite the existing tools in the entrepreneurial environment, a validated, reliable, and context-specific scale tailored to Ifugao entrepreneurship students remains lacking. Thus, this study aims to analyze the psychometric characteristics of a refined version of the questionnaire on entrepreneurial environment that affects the propensity for entrepreneurial activity among Ifugao entrepreneurship students. The study employed a quantitative research design, utilizing a cross-sectional survey approach. The instrument comprises a total of 25 items with a factor design structure consisting of five latent factors: socio-economic conditions, financial support, government policies, non-financial support, and education and training. A total of 133 students in Alfonso Lista, Ifugao, Philippines, participated in the study. Data were analyzed through confirmatory factor analysis (CFA) through the partial least squares–structural equation modeling (PLS-SEM) approach. Subsequently, CFA using SPSS was performed to validate the results. The results showed that there was a total of 24 items, distributed across five subscales. Convergent validity was confirmed, with all average variance extracted (AVE) values exceeding 0.50, while discriminant validity was supported as inter-variable correlations remained below the square root of the AVE. Reliability was robust, with composite reliability (CR) scores exceeding 0.70 and Cronbach's alpha at 0.905. The results suggest that the entrepreneurial environment scale can serve as a valuable tool for measuring the entrepreneurial environment and informing strategic decisions for future entrepreneurs.

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1. INTRODUCTION

Innovation and entrepreneurship are critical drivers for economic growth and development [1]. Entrepreneurship is revolutionary in the context of long-term development because it not only powers economic growth founded on sustainable development principles but also provides the framework for accomplishing and implementing the sustainable development goals (SDGs) [2]. Entrepreneurial activities have become a focal point of academic research. Several experts and scholars have isolated and studied the environmental factors that significantly influence entrepreneurship. The entrepreneurial environment refers to the combination of factors that influence entrepreneurship. It encompasses the sum of the legal and

institutional environment, market environment, financial environment, and entrepreneurial infrastructure, among other aspects [3], [4].

The quality of the entrepreneurial environment is one of the preconditions for the competitiveness of the national economy-the better conditions, the more it can create for entrepreneurs, the more investment could be made in the national economy, which, in turn, contributes to the creation of new jobs and the standard of living [5]. Identifying the factors that affect the creation and growth of new businesses is a topic of significant interest to researchers and policymakers, as new companies are considered vital to a country's growth and economic development [6]. Accordingly, entrepreneurship development requires an environment characterized not only by favorable government policies and procedures but also by an abundance of entrepreneurial and business skills, as well as the knowledge needed to access financial and non-financial assistance that may impact each stage of the entrepreneurial process [7]. Additionally, academic research emphasized that the government possesses most of the non-financial and financial means required to start and operate a business [8]. Also, government support for entrepreneurship (for example, through the reduction of taxes and lower entry costs), along with well-designed formal networks, increases entrepreneurship rates [9]. Lastly, environmental factors can facilitate or inhibit entrepreneurial activities, thereby affecting the perceived benefit of new venture creation; therefore, they may play a crucial role in shaping entrepreneurial intentions among students [10].

While existing literature highlights broader aspects of the university entrepreneurial ecosystem without a tailored measurement tool, there is a lack of validated scales specifically designed to measure the entrepreneurial environment within educational contexts, particularly in developing regions like Ifugao [11]. Additionally, there is a need for a comprehensive framework that captures the nuances of the entrepreneurial environment in educational institutions, as current literature often overlooks specific dimensions that influence entrepreneurial intentions [12]. The interplay between local entrepreneurial environments and individual psychological factors remains underexplored, necessitating a focused study [13]. Thus, this study aims to validate an instrument to determine the entrepreneurial environment that affects the propensity for entrepreneurial activity among Ifugao students pursuing entrepreneurship. This study introduces a validated, context-specific entrepreneurial environment scale designed specifically for Ifugao entrepreneurship students to address identified gaps. Unlike previous research that applies generic scales, this study refines and validates a measurement tool that captures the distinct entrepreneurial landscape of Ifugao. Moreover, the study employs rigorous psychometric analysis using confirmatory factor analysis (CFA) and partial least squares-structural equation modeling (PLS-SEM) to ensure the reliability and validity of the scale. By establishing convergent and discriminant validity, the study provides empirical evidence supporting the reliability and validity of the instrument. The findings of this study contribute to both theory and practice by offering a practical tool for educators, policymakers, and entrepreneurs to assess the entrepreneurial environment. This refined scale serves as a foundation for strategic decision-making and policy formulation aimed at fostering entrepreneurship in Ifugao and other similar contexts. By developing a context-specific entrepreneurial measurement tool, this study ensures relevance and applicability in a developing region with unique socio-economic and cultural conditions. Understanding these elements is crucial for designing effective policy interventions, educational programs, and support systems that empower individuals, stimulate local economic growth, and leverage cultural strengths for sustainable development. Ultimately, this validated instrument provides a reliable basis for enhancing entrepreneurial propensity among students and informing future research on entrepreneurial ecosystems in developing economies.

2. METHOD

This study employed a quantitative research approach using a cross-sectional survey design. This approach was selected because it enabled the rapid and efficient collection of a substantial volume of data from a large number of people. Additionally, the results of quantitative studies can be applied to the target population, which is consistent with the goal of the current investigation. The study's participants were all undergraduate students (first year to fourth year) currently enrolled in the school year 2024-2025 entrepreneurship program at a State University in Ifugao, located at Alfonso Lista, Ifugao, Philippines. The survey included only 133 entrepreneurship students who satisfied the requirements.

A modified questionnaire, based on the open-source research outputs of renowned authors, was used to evaluate the factors influencing students' inclination towards entrepreneurial activity while studying entrepreneurship. A thorough literature analysis examined the current scales of the entrepreneurial environment. The 25 measures were created to assess the entrepreneurial environment after a comprehensive review of the literature. Due to their suitability for the study's participants, the questionnaire was modified. The questionnaire underwent a validation procedure that included reliability testing, field testing, expert pooling, and refinement. The instrument for the field test was developed using the feedback and recommendations of three specialists consulted for preliminary validation.

The CFA method using a PLS-SEM approach, as implemented in SPSS, was employed to assess the scale's validity and reliability. The composite reliability (CR) and outer loading values provided the assessment of the scale's reliability. The average variance extracted (AVE) values were used to evaluate the scale's convergent validity. The heterotrait-monotrait (HTMT) criterion was used to assess discriminant validity in this investigation. The acceptance criteria for the reported values for the scale's validity and reliability are compiled in Table 1 [14].

The outer loading value shows the construct's indicator's dependability. For exterior loads, a value greater than 0.70 is advised. Commonality, or the degree to which endogenous structures in a model describe the indicator, is represented by the square value of the standard outer loading. However, the choice to keep, modify, or remove an item is contingent upon factors like high outer loading values for other items and criteria like CR and AVE values when the outer loading value falls between 0.40 and 0.70. Convergent validity for the scale was obtained by comparing the AVE value with the outer loading value. Only when a square value of the outer loading is used to compute the mean value can the AVE value be determined. The suggested value is more significant than 0.5, indicating that the latent variable is thought to be explained by more than 50% of the variance for reflective indicators. The HTMT value analysis in the given table completed the assessment. To satisfy the measurement model's discriminant validity criteria, the HTMT values in this stage shouldn't be more significant than 0.90.

Additionally, the principal component analysis (PCA) was used in the CFA through SPSS. This study considered the Kaiser-Meyer-Olkin (KMO) value, which gives an idea about whether the factor analysis is good or not, and the Bartlett test (Bartlett test of sphericity), which provides an idea about the correlation between the variables. Moreover, the number of factors with an eigenvalue more significant than one, equal to the number of factors included in the model, was taken into consideration, and the factor loadings are at least 0.50. The required rotation operations were carried out to determine the optimal factor structure, and the Direct Oblimin rotation method was chosen to establish the proper rotation (oblique or orthogonal) for improved data interpretability and to verify the correlation of the factors. The Cronbach's alpha reliability test assessed how well the items on the scales measure the same construct.

Table 1. Acceptance criteria of reliability and validity for reflective measurement model assessments in PLS-SEM.

Categories	Indexes	Assumptions
Internal consistency reliability	CR	CR: 0.70–0.90 (satisfied)
Indicator reliability	Outer loadings	Outer loading >0.70
		Outer loading <0.40 (should be eliminated)
Convergent reliability	AVE	AVE>0.50
Discriminant validity	HTMT ratio	<0.85

3. RESULTS AND DISCUSSION

3.1. Validity and reliability of entrepreneurial environment using PLS-SEM

The results of the reflective measurement model in Table 2 give strong evidence of reliability and validity on all constructs. This attests to the robustness of the instrument applied to estimate the entrepreneurial environment influencing entrepreneurial activity. Outer loadings, which measure the association between the observed items and their respective latent constructs, almost invariably exceed the recommended threshold of 0.70.

Nevertheless, Item number 1 on Component 3 (0.678) remains acceptable for determining CR and AVE values, showing that items sufficiently represented underlying constructs and demonstrated convergent validity. The model's internal consistency was evaluated using a threshold value of 0.70, particularly while ascertaining the item's minimum factor loadings. When failure to remove measurements with loadings below 0.70 could increase CR above the threshold value, such measurements must be eliminated [15], [16].

Meanwhile, the convergent validity was determined using the widely accepted method of AVE. The AVE value indicates that, on average, each construct can explain more than half of the variance of its measuring items and must be more than 0.50 [17], [18]. Results reveal that all constructs' AVE estimates were far above the recommended threshold of 0.50, ranging from a minimum of 0.614 to a maximum of 0.664. These constructs explain a reasonable variance concerning the respective observed variable. Also, the CR values for all constructs are above 0.70, with Component 5 obtaining a maximum CR of 0.882; this indicates high internal consistency across items and evidence that constructs are measured reliably and consistently. A CR of 0.70 or greater indicates strong reliability [15], [19], [20]. The validated constructs are reliable instruments for inquiry for researchers who painstakingly investigate entrepreneurial environmental

factors that predict entrepreneurial propensity. They could benefit policymakers and other stakeholders by helping them develop targeted interventions that enhance specific aspects of the entrepreneurial environment.

Table 2. Assessment of the measurement model of entrepreneurial environment

Component	Items	Outer loadings	AVE	CR
1	1	0.799	0.632	0.849
	2	0.742		
	3	0.858		
	4	0.771		
	5	0.750		
2	1	0.784	0.614	0.840
	2	0.793		
	3	0.709		
	4	0.805		
	5	0.775		
3	1	0.678	0.631	0.817
	2	0.704		
	3	0.701		
	4	0.782		
	5	0.812		
4	1	0.772	0.664	0.865
	2	0.814		
	3	0.790		
	4	0.784		
	5	0.785		
5	1	0.752	0.651	0.882
	2	0.893		
	3	0.756		
	4	0.792		
	5	0.762		

The confirmatory findings regarding HTMT analysis, as depicted in Table 3, demonstrate adequate discriminant validity among the five constructs: socio-economic conditions, financial support, government policies, non-financial support, and education and training. These constructs are empirically distinct, having all HTMT values below the commonly accepted 0.85 threshold, indicating that these constructs are measuring different dimensions of the entrepreneurial environment, as reflected in the HTMT value between socio-economic conditions with financial support, 0.796, between government policies and non-financial support, 0.674; this confirms sufficiency on discriminant validity. Other very low values include a minimum HTMT of 0.223 between financial support and government policy, and a value of 0.232 between financial support and education and training, which strongly enhances the separation of constructs. The confirmed discriminant validity affirmatively ensures that the measurement model exhibits robustness for future studies examining these constructs, without concern for overlap or redundancy.

Table 3. Discriminant validity using HTMT ratio of correlations

HTMT	1	2	3	4	5
Component 1					
Component 2	0.796				
Component 3	0.509	0.223	0.631		
Component 4	0.712	0.237	0.674	0.780	
Component 5	0.583	0.232	0.599	0.631	0.693

PLS-SEM's discriminant validity is evaluated using the HTMT ratio of correlations. The HTMT can attain greater specificity and sensitivity rates than cross-loadings and the Fornell-Lacker criterion. From the HTMT results, if the HTMT values are less than 0.85, it indicates no discriminant validity problems. This implies that the HTMT criterion did not detect collinearity problems among the latent constructs [14], [21], [22].

3.2. Validity and reliability of entrepreneurial environment using SPSS

Results of the KMO and Barlett's test are shown in Table 4. The data sample size for factor analysis must be sufficient to perform a reliable analysis. The KMO test determines whether the sample is adequate and identifies the reliable elements within it. Most authors advise a number greater than 0.5 as a prerequisite for factor analysis. However, the KMO value for minimal acceptability is 0.5 [23]. For every item, KMO assesses an overall measure of sampling adequacy (MSA) [24].

The KMO value of 0.761 in this study confirms that the sample size is adequate for this analysis because. This value exceeds the minimum threshold of 0.60 and is classified as 'middling', indicating a sufficient level of sampling adequacy for factor analysis [23], [25]. This indicates that the correlations among the variables are sufficiently strong to identify latent factors. Bartlett's test of sphericity also gives a significant Chi-square value (1547.35, df=276, Sig.=0.000), meaning a correlation matrix is not an identity matrix. This implies that there are significant interconnections among the variables in a manner that justifies moving ahead with factor analysis. A non-significant result would indicate that the edifice is weak or nonexistent among these variables, thereby ruling out possibilities for factor analysis. Bartlett's test result should be significant at 0.05 [26], [27].

Table 4. KMO and Bartlett's test

KMO and Bartlett's test		
KMO MSA		0.761
Bartlett's test of sphericity	Approx. Chi-square	1547.35
	Df	276
	Sig.	0.000

Table 5 presents the parallel analysis of the eigenvalues for retaining the five components. The five components—socio-economic conditions, financial support, government policies, non-financial support, and education and training—shown in Table 5, provide significant information on the variance each component explains. Eigenvalue denotes the amount of variance explained by a particular component. All components, hence, have eigenvalues greater than 1, ranging from 1.37 to 9.003 in this analysis. According to Kaiser's criterion, components with an eigenvalue greater than one are termed significant and retained for further study. This criterion defined the number of components to be retained [28], [29]. This means that all components make meaningful contributions to explaining the variance in the data and should remain within the factor structure.

Table 5. Parallel analysis

Component	Eigenvalues	Decision
1	1.37	Accept
2	1.96	Accept
3	1.89	Accept
4	1.43	Accept
5	9.003	Accept

Finally, the CFA, conducted using SPSS with the Varimax rotation method, is presented in Table 6. The result of the rotated component matrix presented similar results to those of the validity and reliability of entrepreneurial environment using PLS-SEM. Each item loads strongly on one component with no significant cross-loadings, which indicates that items strongly relate to their corresponding latent constructs. Component 1 includes Items 2, 3, 4, and 5, with loading estimates ranging from 0.711 to 0.822; thus, it is a relatively cohesive underlying construct. In the same way, Components 2, 3, 4, and 5 have high item loadings within their respective ranges: 0.671 to 0.868, 0.762 to 0.883, 0.719 to 0.815, and Component 5: 0.774 to 0.824, respectively, further confirming the distinctiveness of the constructs. The lack of significant cross-loadings supports the discriminant validity of the scale, whereas high loadings within components affirm convergent validity. Confirmatory results revealed a well-defined factor structure with pronounced clustering of items across five components, thereby establishing the validity and reliability of the instrument.

Component 1 assesses the growth of the local economy, the role of successful businesspeople as role models, the influence of local culture on creativity and risk-taking, and the participation of family members in entrepreneurial endeavors. Component 2 assesses the funding sources, including interest-free loans and startup capital, that entrepreneurs can access to support their ventures. Component 3 evaluates the taxation, approval process facilitation, and entrepreneurial institution optimization methods that government departments provide to enterprises. Component 4 measures the support entrepreneurs receive through resources, information, development opportunities, and professional advice. Finally, Component 5 evaluates training for entrepreneurs to enhance their capability, related activities, and innovation and entrepreneurship education. The results suggest that the clarity and robustness of the factor structure are sufficient to provide confidence in using the instrument when exploring the dimensions of the entrepreneurial environment.

The results corroborate the theoretical fit of the constructs, ensuring that they can be applied to future studies with confidence.

Table 7 displays Cronbach's alpha for every variable. Each of the five scales had reliability test values of at least 0.70, which indicates acceptable internal consistency or reliability. The instrument's capacity to measure the same underlying constructs was estimated using Cronbach's alpha reliability analysis.

Table 6. Rotated component matrix

Items	Components				
	1	2	3	4	5
Item 2	0.714				
Item 3	0.711				
Item 4	0.792				
Item 5	0.822				
Item 6		0.789			
Item 7		0.753			
Item 8		0.868			
Item 9		0.671			
Item 10		0.850			
Item 11			0.762		
Item 12			0.883		
Item 13			0.766		
Item 14			0.782		
Item 15			0.772		
Item 16				0.794	
Item 17				0.783	
Item 18				0.719	
Item 19				0.815	
Item 20				0.785	
Item 21					0.782
Item 22					0.824
Item 23					0.780
Item 24					0.774
Item 25					0.775

Table 7. Test of reliability

Components	No. of items	Alpha	Interpretation
1	5	0.754	Adequate
2	5	0.733	Adequate
3	4	0.713	Adequate
4	5	0.784	Adequate
5	5	0.831	Good
Whole questionnaire	24	0.904	Excellent

According to the findings, the dependability coefficients of the four scale components varied from 0.713 to 0.831. Cronbach's alpha has a minimum acceptable value of 0.70. The standard range's internal consistency is below this threshold. In the meantime, 0.95 is the highest predicted value; any number higher than this is interpreted as duplication or redundancy. The redundant elements must be eliminated from both products that measure the same construct element exactly [30]–[32]. The set of 24 measures is sufficient for group measurement using SPSS, as Cronbach's alpha is greater than 0.700.

4. CONCLUSION

This study aims to validate the psychometric properties of an abridged version of the questionnaire to evaluate the entrepreneurial environment, which assesses the propensity of entrepreneurship students towards entrepreneurial activities. This study demonstrates strong validity and reliability in determining the entrepreneurial environment by employing PLS-SEM and SPSS methods. The results of the PLS-SEM show high loadings, CR above 0.70, and AVE above 0.50, establishing convergent validity and internal consistency. HTMT below 0.85 further testifies to discriminant validity, ensuring the distinctiveness of the constructs. According to the SPSS analysis, the KMO measure is 0.761, and the Bartlett's test is significant; therefore, factor analysis is suitable. Eigenvalues above 1 justify retaining meaningful components. The rotated component matrix shows well-defined factors with no cross-loadings, confirming convergent and discriminant validity. Additionally, Cronbach's alpha will yield satisfactory internal consistency, and the total questionnaire will be categorized as having excellent reliability. The results demonstrate the

instrument's effectiveness in analyzing entrepreneurial environments, providing a sound foundation for policymakers and researchers to improve entrepreneurial ecosystems.

This study has several limitations that should be taken into consideration. First, it is geographically limited to Ifugao entrepreneurship students, which may restrict the generalizability of its findings to other regions with different economic and cultural contexts. Additionally, while informative, the sample size of 133 respondents may not fully capture the diversity of entrepreneurship or business students, potentially affecting the robustness of the psychometric validation. Moreover, the study employs a cross-sectional approach, measuring entrepreneurial environment perceptions simultaneously, limiting insights into changes over time. Some relevant factors, such as personal entrepreneurial mindset, family background, and the role of digital transformation, were not explicitly considered, potentially omitting key influences on entrepreneurial propensity.

Furthermore, external validation of the scale remains limited, as it was tested only within this specific study population. To address these limitations, future research should expand the study by increasing the sample size to multiple regions and other higher education institutions, both private and public, to enhance statistical reliability. A longitudinal approach is recommended to examine how perceptions of the entrepreneurial environment evolve over time. Incorporating qualitative methods, such as interviews or focus groups, can provide deeper insights into entrepreneurial motivations and challenges. Refining the instrument to include emerging factors, such as digital entrepreneurship, will increase its relevance. Lastly, findings should be leveraged to inform policies and curriculum development, ensuring educational institutions and policymakers create more supportive environments for student entrepreneurs.

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AUTHOR CONTRIBUTIONS STATEMENT

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Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Client William M. Malinao	✓	✓	✓		✓	✓	✓			✓	✓	✓	✓	
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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors state no conflict of interest.

INFORMED CONSENT

To maintain the integrity of the study, respondents' voluntary involvement was ensured, and they were informed of their right to withdraw from the study at any time, should they so desire, through a process of informed consent. Only those who signed the informed consent form were permitted to participate in the study.

ETHICAL APPROVAL

The study population is not vulnerable when conducting the study. Sufficient information and reassurance regarding their participation in the research, including benefits, risks, and confidentiality, were included in the informed consent. The 2012 Data Privacy Act (RA 10173) likewise observed their privacy and anonymity. The university approved using humans as participants during the survey, following the transparent institutional policies on data confidentiality, security, and disposal.

DATA AVAILABILITY

The data supporting this study's findings are available upon request from the corresponding author, [CWMM], subject to the approval of the institution or study locale. However, due to certain restrictions, the data, which contains information that could compromise the privacy of research participants, is not publicly available.

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