Confirmatory Factor Analysis of Entrepreneurial Competencies in a Sample of Nigerian Small Business Owners

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Abstract

This study assessed the structural validity of an entrepreneurial competencies' measurement model among small business owners in Zamfara State, Nigeria. The initial exploratory factor analysis (EFA) identified three key dimensions—entrepreneurial skills, entrepreneurial knowledge, and entrepreneurial attitude—with a cumulative variance of 66.40%, indicating a robust representation of the underlying dimensions. However, the subsequent CFA results present a mixed result, with the model demonstrating significant fit issues (χ^2 = 348.827, df = 87, p < 0.001) and suboptimal fit indices, including a Comparative Fit Index (CFI) of 0.607 and a Root Mean Square Error of Approximation (RMSEA) of 0.259. Despite these challenges, the study contributes to the literature on locational evaluation of entrepreneurial competencies in the specific context of Zamfara State, Nigeria. The study also underscores the need for further refinement and exploration to enhance the accuracy of measurement tools in assessing these critical skills among small business owners.

Keywords: Entrepreneurial Competencies, Entrepreneurial Skills, Entrepreneurial Knowledge, Entrepreneurial Attitude, Small Business Owners, Zamfara State.

Introduction

Entrepreneurial competencies refer to a distinctive set of skills, knowledge, and attributes that are deemed essential for achieving success in entrepreneurial pursuits (Kyrgidou and Petridou, 2013; Usai *et al.*, 2018). These competencies include several capabilities entrepreneurs possess and use in identifying, creating, and capitalising on opportunities, as well as navigating the challenges inherent in Nigeria's business environment. These competencies go beyond mere technical skills to include qualities such as creativity, adaptability, risk-taking, strategic thinking, and effective decision-making (Mayr *et al.*, 2020; Nair and Pandey, 2016). The recognition and understanding of these competencies have become focal points in the field of entrepreneurship, signifying their critical role in shaping the outcomes of entrepreneurial ventures. Scholars and practitioners

alike have increasingly acknowledged the significance of these competencies as they contribute to the ability of entrepreneurs to innovate, manage resources efficiently, and ultimately enhance the likelihood of entrepreneurial success (Mbeteh and Pellegrini, 2022; Pennetta *et al.*, 2023).

However, the unique challenges faced by small business owners in Nigeria, including limited resources, regulatory constraints, and market uncertainties, has fuelled spirited research activities from local scholars (Danibrahim *et al.*, 2022; Danibrahim *et al.*, 2023; Pulka *et al.*, 2021). However, a standing problem to these is the absence of a locally grounded measure of entrepreneurial competencies. Thus, notwithstanding the availability of entrepreneurial competency scales in the extant literature (Li and Antoncic, 2023; Mamun *et al.*, 2017; Riyanti *et al.*, 2022), there remains a notable gap in the validation and reliability of such instruments in the context of Nigerian small business sector. This study seeks to address this gap by undertaking a confirmatory factor analysis (CFA) of a measure of entrepreneurial competencies tailored to the specific realities of Nigerian small business operations.

In the light of the foregoing, the overall motivation of the study in validating the psychometric properties of entrepreneurial competencies in Nigerian small business owners through CFA is to contribute to the development of reliable and culturally relevant measurement tools, essential for advancing research and interventions in entrepreneurship. Accordingly, this study aims to confirm the underlying factors of entrepreneurial competency scale in the unique socio-economic and cultural milieu of Nigerian small businesses. Establishing the psychometrics of the scale holds the promise of not suggesting a psychometrically valid measurement instrument but also providing practical insights that can inform educational programs, policy interventions, and support mechanisms tailored to enhance the entrepreneurial sphere in Nigeria (Salisu, 2021). The findings are anticipated to contribute substantially to the academic literature, offering a validated assessment tool of entrepreneurial competencies in a Nigerian context.

Entrepreneurial Competencies
Entrepreneurial competencies refers to a set of skills, knowledge, and attitudes possessed by entrepreneurs and used in steering their enterprises through the ever-changing business environment (Danibrahim *et al.*, 2022). These three elements (i.e., skills, knowledge, and attitudes) constitute the entrepreneurial competency domain. Entrepreneurial skills, the first element, is the learned ability to perform specific tasks effectively (Lyons *et al.*, 2019). These skills, acquired through training and experience, cover a spectrum of entrepreneurial attributes. For example, the skill of opportunity recognition enables entrepreneurs to identify business prospects by discerning market gaps and anticipating unmet needs (Lim *et al.*, 2021). Innovativeness, reflecting creativity, allows entrepreneurs to introduce novel products or services for competitiveness (Khan, 2021). Competence in risk management involves assessing and handling business risks, ensuring informed decisions amid uncertainties (Bui *et al.*, 2023). Adaptability, a crucial skill, underscores an entrepreneur's flexibility to adjust strategies in response to market shifts and challenges (Bajwa *et al.*, 2017). Decision-making skills align choices with business objectives (Sanda and Sallama, 2023), while financial literacy involves understanding financial concepts and resource management (Anshika and Singla, 2022). Networking skills build professional relationships for business growth, and leadership skills inspire teams towards common goals (Soomro *et al.*, 2020). Effective communication

facilitates interactions with stakeholders, and problem-solving skills ensure the smooth operation of the business (Dike and Emmanuel, 2020). These skills collectively constitute the competence necessary for navigating the dynamic entrepreneurial sphere, contributing to venture success and sustainability.

The second element of entrepreneurial competence is knowledge. Knowledge is the awareness and understanding of facts, information, skills, or concepts acquired through experience, education, or training, enabling individuals to make informed decisions and effectively apply their understanding in various contexts (Alkhalaf *et al.*, 2022; Salisu, 2021). Entrepreneurial knowledge covers a range of areas relevant to starting, managing, and growing a business, contributing to informed decision-making and strategic planning. Key components of entrepreneurial knowledge include market dynamics, industry trends, financial principles, regulatory frameworks, and a deep understanding of the products or services being offered (Usai *et al.*, 2018). Entrepreneurs with high levels of entrepreneurial knowledge are equipped to make well-informed choices, identify opportunities, and address challenges, ultimately enhancing the likelihood of success in their entrepreneurial ventures.

The third element of the entrepreneurial competence framework is attitude. Attitude is a mental and emotional disposition or inclination, reflecting an individual's feelings, beliefs, and predispositions towards people, situations, or ideas (Danibrahim *et al.*, 2023). It includes positive attitudes such as resilience, optimism, adaptability, and a proactive mindset (Oliver *et al.*, 2022). Resilience enables entrepreneurs to bounce back from setbacks, while optimism fosters a positive outlook that propels them forward. Adaptability is crucial for navigating uncertainties, allowing entrepreneurs to embrace change and adjust strategies as needed. A proactive attitude involves taking initiative and seeking opportunities rather than passively reacting to circumstances (Kaur and Chawla, 2023). Entrepreneurs with a well-developed entrepreneurial competence in terms of attitude are better equipped to handle the dynamic nature of business and persevere in the face of challenges, contributing to the long-term success of their ventures.

Methodology
Population and Study Area
A cross-sectional survey was conducted among small business owners in Zamfara State, Nigeria. A pilot sample of three small business owners from each of the fourteen local government areas (LGAs) was taken. However, 5 were taken from Gusau, the capital of the state. The other LGAs include Anka, Bakura, Birnin Magaji/Kiyaw, Bukkuyum, Bungudu, Chafe (Tsafe), Gummi, Kaura Namoda, Maradun, Maru, Shinkafi, Talata Mafara, and Zurmi. To ensure comprehensive coverage, the population of small business owners was categorised into 20 based on the type of activities conducted by the form. These include Retail Businesses, Food and Beverage Businesses, Agribusiness, Artisanal and Craft Businesses, Technology and IT Services, Health and Wellness Services, Education and Training, Beauty and Personal Care, Construction and Real Estate, Transportation and Logistics, Manufacturing and Production, Consultancy Services, Tourism and Hospitality, Entertainment and Events, Renewable Energy, Waste Management and Recycling, Financial Services, E-Commerce and Retail Trade, Textile and Fashion, and Automobile Services.

Measures

The study construct was measured as a multidimensional variable consisting of skills, knowledge, and attitude. The entrepreneurial skills dimension was measured using 6 items adapted from Lyons and Campbell (2022) and Mamun *et al.* (2017). The items cover basic entrepreneurial skill on Opportunity Recognition, Innovativeness, Risk Management, Adaptability, Decision-Making, and Financial Literacy (see Table 1 for the items). The entrepreneurial knowledge dimension was measured using 4 items adapted from Miralles *et al.* (2015) and (Yasir *et al.*, 2017). Finally, entrepreneurial attitude was measured using 5 items adapted from Anwar *et al.* (2021) and Taneja *et al.* (2023). All items were evaluated using Likert anchors: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree 5 = Strongly Agree (Likert, 1932).

Table 1
Dimensions and Measuring Items of the Entrepreneurial Scale

	Items/Dimensions	
SN	**Entrepreneurial Skills**	**Code**
1.	I am good at identifying business opportunities in the market.	EnS1
2.	I consistently come up with creative solutions to business challenges.	EnS2
3.	I am confident in managing risks associated with business decisions.	EnS3
4.	I can adjust my business strategies in response to market shifts and challenges.	EnS4
5.	I make informed and timely decisions aligned with my business objectives.	EnS5
6.	I can make sound financial decisions for my business.	EnS6
	Entrepreneurial Knowledge	
7.	I very well understand the market operations relevant to my business.	EnK1
8.	I stay well-informed about current trends and developments in my industry.	EnK2
9.	I have a sound knowledge of financial principles related to my business.	EnK3
10.	I am familiar with the regulatory frameworks relevant to my business.	EnK4
	Entrepreneurial Attitude	
11.	I am resilient in the face of challenges in my entrepreneurial experience.	EnA1
12.	I positively believing in the success of my entrepreneurial ventures.	EnA2
13.	I am flexible enough to adjust my strategies to changing market conditions.	EnA3
14.	I take initiative and actively seek out business opportunities.	EnA4
15.	I demonstrate persistence in working towards my entrepreneurial goals.	EnA5

Data Collection Procedures

The researcher systematically administered and collected back the paper-and-pencil questionnaires from 45 respondents across the 14 LGAs of Zamfara State. Firstly, sufficient copies of the questionnaire were printed. Secondly, communication channels were established with respondents, and field visits were made to the selected locations across the 14 LGAs. Thirdly, informed consent was obtained from each respondent, and the questionnaires were handed out with clear instructions. Fourthly, the completed questionnaires were promptly collected, with thorough checks for completeness and accuracy conducted on the spot. The collected forms were securely transported to avoid loss or damage. Fifthly and finally, data entry and analysis were carried out systematically in MS Excel©. The data were then screened for missing values, errors, and univariate outliers using the same MS Excel©. Multivariate outliers were assessed using the Mahalanobis (1936)

distance (D^2) in IBM SPSS. No outlying observations were detected (n = 45; df = 15; p = 0.001; χ^2 = 37.70; $D^2 \geq \chi^2$). The cleaned data were then used for the CFA.

Data Analysis

CFA was performed in JASP (JASP Team, 2023) to evaluate the measurement model validity of the entrepreneurial competencies model. The model was estimated using the maximum likelihood estimation method (Jöreskog, 1969). This method aims to maximise the likelihood function, assessing how well the proposed model aligns with the observed data. Maximum likelihood estimation assumes that the observed data are normally distributed (Chambers *et al.*, 2012), and it is a commonly used method in structural equation modelling (Goretzko *et al.*, 2023).

Further, several fit indices were used in evaluating the overall fit of the model to the observed data. Specifically, the Chi-Square (χ^2) statistic tests the discrepancy between the observed and expected covariance matrices (Alavi *et al.*, 2020). However, due to its sensitivity to sample size, researchers often consider additional fit indices. The Comparative Fit Index (CFI) measures how well the model fits the data relative to a null model, with a threshold of 0.95 indicating good fit (Bentler, 1990). The Root Mean Square Error of Approximation (RMSEA) evaluates the discrepancy between the model and the population covariance matrix. According to Cangur and Ercan (2015, p. 157), a "RMSEA index smaller than 0.06 suffices." The Standardised Root Mean Square Residual (SRMR) measures the average absolute difference between the observed and predicted correlations, with a value between 0.10 and 0.05 indicating good fit (Cangur and Ercan, 2015). The Tucker-Lewis Index (TLI) assesses the improvement of a model compared to a baseline model, with a threshold value > 0.90 generally indicating an acceptable fit (Tucker and Lewis, 1973). These fit indices collectively assist in determining the adequacy of the proposed model in representing the underlying structure of entrepreneurial competencies.

Results and Discussion

Descriptives

The descriptive statistics shown in Table 2 for items measuring entrepreneurial competencies, including entrepreneurial skills, knowledge, and attitude, provide an overview of respondents' perceptions. The average scores indicate a moderate level of perceived competencies in each domain. Standard errors suggest precision in mean estimates, while standard deviations and coefficients of variation reveal a moderate to high degree of variability and relative variability, respectively. The diverse range of responses, spanning the entire scale from 1.000 to 5.000, underscores the heterogeneity in individual perceptions. The findings highlight the multidimensional nature of entrepreneurial competencies in the study pilot sample, suggesting the need for caution when evaluating and interpreting respondents' self-assessed entrepreneurial skills, knowledge, and attitude.

Table 2
Descriptive Statistics of Construct Indicators

	Mean	**SEM**	**SD**	**CoV**	**Min.**	**Max.**
EnS1	3.578	0.147	0.988	0.276	2.000	5.000
EnS2	3.622	0.157	1.051	0.290	1.000	5.000
EnS3	3.689	0.158	1.062	0.288	2.000	5.000
EnS4	3.511	0.154	1.036	0.295	2.000	5.000
EnS5	3.489	0.161	1.079	0.309	1.000	5.000
EnS6	3.622	0.163	1.093	0.302	2.000	5.000
EnK1	3.556	0.167	1.119	0.315	1.000	5.000
EnK2	3.489	0.154	1.036	0.297	1.000	5.000
EnK3	3.511	0.173	1.160	0.330	1.000	5.000
EnK4	3.422	0.160	1.076	0.315	1.000	5.000
EnA1	3.622	0.221	1.482	0.409	1.000	5.000
EnA2	3.489	0.241	1.618	0.464	1.000	5.000
EnA3	3.267	0.221	1.483	0.454	1.000	5.000
EnA4	3.756	0.232	1.554	0.414	1.000	5.000
EnA5	2.844	0.225	1.507	0.530	1.000	5.000

Correlations

The item-level Pearson's correlation results offer a detailed understanding of the relationships between different variables in the study, specifically focusing on age group (AgeG), educational qualification (EducQ), work experience (Exper), and various items measuring entrepreneurial skills (EnS), knowledge (EnK), and attitude (EnA). Notable findings include a significant positive correlation between work experience (Exper) and age group (AgeG), indicating that older participants tend to have more work experience. In the entrepreneurial skills domain, items EnS3, EnS4, and EnS5 show strong positive correlations, suggesting a high degree of interrelatedness in these skills. Similarly, in the entrepreneurial knowledge domain, positive correlations are observed among items EnK1, EnK2, EnK3, and EnK4. Conversely, in the entrepreneurial attitude domain, correlations are less consistent, with some negative associations observed among attitude items. Noteworthy are the strong positive correlations between EnS2 and EnS3, EnS4, EnS5, and EnS6, indicating a potential grouping of these skills.

Table 3

Pearson's Correlation Statistics

Variable	AgeG	EducQ	Exper	EnS1	EnS2	EnS3	EnS4	EnS5	EnS6	EnK1	EnK2	EnK3	EnK4	EnA1	EnA2	EnA3	EnA4	EnA5
1. AgeG	—																	
2. EducQ	-0.057	—																
3. Experience	0.777	-0.105	—															
4. EnS1	0.086	-0.042	0.004	—														
5. EnS2	0.060	0.119	-0.088	0.718	—													
6. EnS3	0.128	-0.049	0.006	0.803	0.686	—												
7. EnS4	0.285	-0.195	0.160	0.793	0.641	0.623	—											
8. EnS5	0.202	-0.034	0.067	0.603	0.828	0.512	0.788	—										
9. EnS6	0.285	-0.195	0.133	0.669	0.625	0.816	0.796	0.680	—									
10. EnK1	-0.072	0.022	-0.029	0.525	0.221	0.569	0.357	0.109	0.361	—								
11. EnK2	0.057	0.022	0.004	0.583	0.320	0.534	0.482	0.147	0.387	0.740	—							
12. EnK3	0.056	-0.054	0.084	0.430	0.237	0.445	0.534	0.268	0.604	0.739	0.581	—						
13. EnK4	0.118	0.057	0.091	0.556	0.305	0.475	0.597	0.288	0.544	0.593	0.809	0.788	—					
14. EnA1	0.031	-0.050	0.075	-0.251	0.196	0.235	0.167	0.195	0.132	0.020	0.123	0.168	0.159	—				
15. EnA2	-0.040	0.137	-0.152	0.160	0.151	0.104	0.146	0.068	0.094	0.148	0.247	0.215	0.257	0.477	—			
16. EnA3	0.066	0.030	-0.077	-0.045	0.008	0.155	-0.046	0.002	0.176	0.018	0.061	0.077	0.113	0.523	0.475	—		
17. EnA4	0.123	0.082	0.126	0.050	0.053	0.022	0.065	0.019	0.011	0.171	0.161	0.197	0.131	0.364	0.699	0.335	—	
18. EnA5	0.004	-0.129	-0.066	-0.152	-0.167	0.012	-0.108	-0.218	-0.005	0.147	0.093	0.241	0.125	0.462	0.489	0.436	0.566	—

Exploratory Factor Analysis (EFA)

Cabrera-Nguyen (2010) suggests running an EFA in scale development and validation. In line with this recommendation, an EFA was performed on the 15-item entrepreneurial competencies scale using JASP based on the minimum residual estimation technique (Comrey, 1962). The eigenvalues were calculated using the oblimin technique of oblique rotation (Crawford, 1975), setting an item loading cut-off point at .60, and adhering to Kaiser's (1958) criterion of eigenvalues greater than 1. Cattell's (1966) scree plot was employed in visualising the eigenvalues (Figure 1). The results, displayed in Table 4, returned a 3-factor structure (χ^2 = 249.086; df = 63; p < 0.001) with a cumulative variance of 66.40% and satisfactory component loadings ranging between 0.613 and 0.967.

Table 4

Factor Loadings and Factor Characteristics

Items	Factor Loadings			Uniqueness
	EnS	**EnK**	**EnA**	
EnS5	0.967			0.189
EnS2	0.898			0.250
EnS4	0.746			0.221
EnS6	0.713			0.277
EnS1	0.667			0.220
EnS3	0.613			0.315
EnK1		0.870		0.299
EnK2		0.839		0.277
EnK4		0.795		0.257
EnK3		0.772		0.316
EnA2			0.815	0.321
EnA4			0.716	0.485
EnA5			0.670	0.480
EnA1			0.634	0.514
EnA3			0.631	0.617
Factor Characteristics:				
Eigenvalues	6.084	3.184	1.694	
Unrotated proportion variance	0.388	0.184	0.092	
Unrotated cumulative variance	0.388	0.572	0.664	

It is noteworthy that the entrepreneurial skills factor retains its six indicators with an eigenvalue of 6.084 and explains 33.80% of the variance in the model. Similarly, the entrepreneurial knowledge factor retains its four indicators with an eigenvalue of 3.184 and explains 18.40% of the model's variance. The third factor, entrepreneurial attitude, did not lose any of its five indicators but accounts lowest regarding the model's variance of 9.20%.
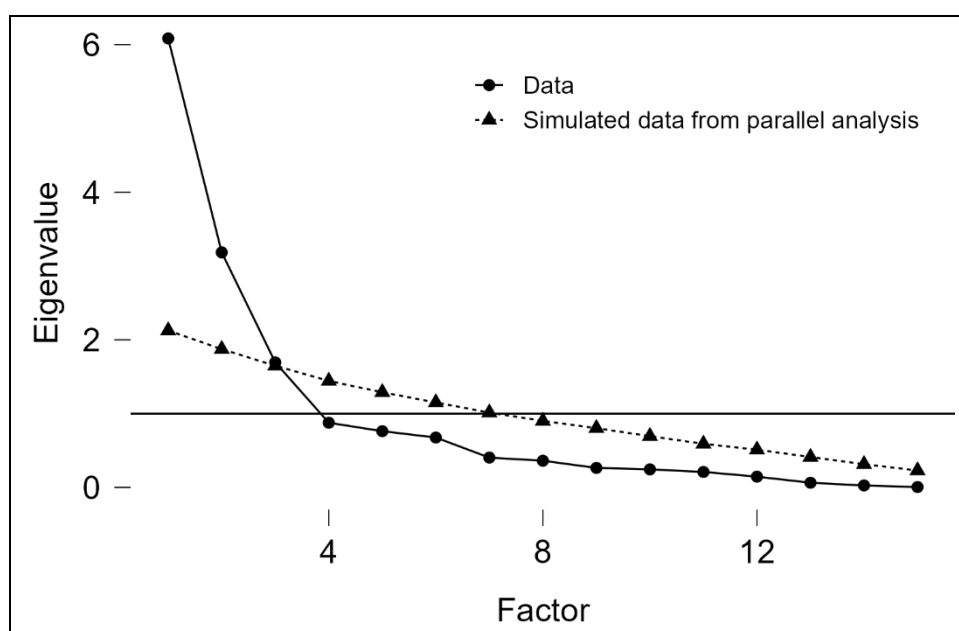

Figure 1. Scree Plot

Confirmatory Factor Analysis

The chi-square statistics (χ^2 = 348.827, df = 87, $p < 0.001$) indicate a significant discrepancy between the proposed model and the observed data (Alavi *et al.*, 2020). However, given the sample size of 45, the obtained χ^2 value may be influenced by the limitations inherent in smaller samples. Small sample sizes have insufficient power to detect differences between competing models (Mwansisya *et al.*, 2021), often leading to significant χ^2 values, thus necessitating the use of additional fit indices that are less sensitive to sample size. In their review on CFA reporting practices by published authors in a top psychology journal, Goretzko *et al.* (2023) observe that the most commonly used model fit indices in CFA include RMSEA, SRMR, CFI, GFI, and TLI. Accordingly, this study reported these five indices (Table 5) in addition to the χ^2 already mentioned.

Table 5
Additional Model Fit Indices

Index	Value
Comparative Fit Index (CFI)	0.607
Root Mean Square Error of Approximation (RMSEA)	0.259
Standardised Root Mean Square Residual (SRMR)	0.095
Goodness of Fit Index (GFI)	0.881
Tucker-Lewis Index (TLI)	0.526

The CFI of 0.607 shown in Table 5 suggests a relatively poor fit, falling below the conventional threshold of 0.9 for optimal fit (Bentler, 1990). Similarly, the RMSEA at 0.259 indicates a less-than-ideal fit, surpassing Cangur and Ercan's (2015) sufficing threshold of 0.06. The SRMR of 0.095, though moderate, suggests room for improvement, with values below 0.08 typically considered acceptable (Cangur and Ercan, 2015). The GFI at 0.881, when considered along with the robust factor loadings in Table 4, indicates a reasonable fit but leaves space for enhancement (Hooper *et al.*, 2008). The Tucker-Lewis Index (TLI) result of 0.526 suggests that the model's fit falls below the commonly recommended threshold of 0.90, indicating a suboptimal fit to the data (Tucker and Lewis, 1973). Collectively, these indices imply that the entrepreneurial competencies model has promising implications despite its limitations and may thus benefit from refinement. A schematic representation of the model is shown in Figure 2.
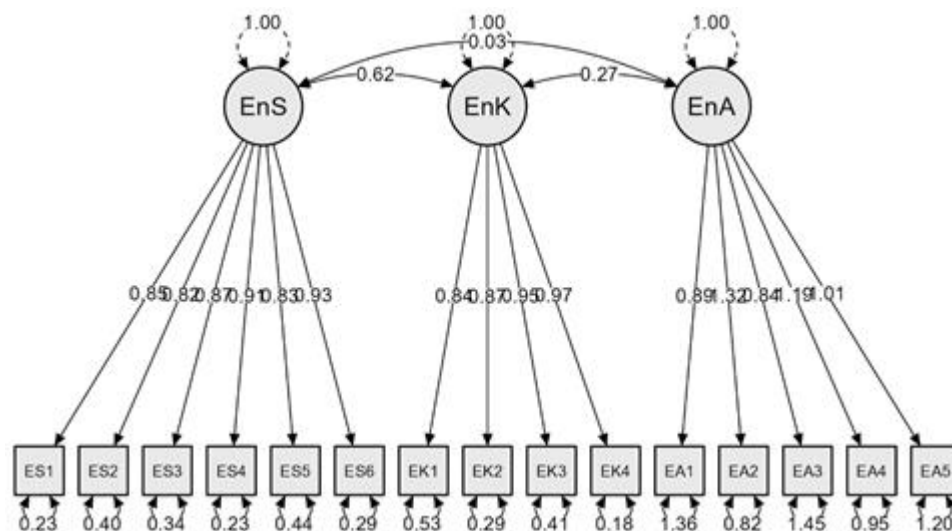
Figure 2. The Study Model

Parameter Estimates and Factor Covariances

The parameter estimates in Table 6 reveal strong and statistically significant relationships between the three latent factors of the entrepreneurial competencies construct and their respective indicators. For entrepreneurial skills, all indicator estimates (EnS1 to EnS6) are positive, ranging from 0.822 to 0.935, with tight standard errors and high z-values, indicating robust factor loadings. Similarly, entrepreneurial knowledge indicators (EnK1 to EnK4) exhibit positive estimates ranging from 0.836 to 0.975, all statistically significant, suggesting a substantial relationship between the latent factor and its indicators. For entrepreneurial attitude, the estimates for EnA1 to EnA5 are positive and range from 0.838 to 1.321, demonstrating significant factor loadings. The narrow confidence intervals and low p-values across all estimates reinforce the reliability and validity of the factor structure (Salisu *et al.*, 2020), supporting the notion that the selected indicators effectively capture the underlying dimensions of entrepreneurial competencies.

Table 6
CFA Parameter Estimates

Factor	Indicator	Estimate	Std. Error	z-Value	*p*-Value	95% CI Lower	95% CI Upper
Entrepreneurial Skills	EnS1	0.851	0.118	7.235	< .001	0.620	1.081
	EnS2	0.822	0.132	6.237	< .001	0.564	1.080
	EnS3	0.872	0.131	6.656	< .001	0.615	1.129
	EnS4	0.907	0.122	7.436	< .001	0.668	1.147
	EnS5	0.834	0.137	6.086	< .001	0.566	1.103
	EnS6	0.935	0.130	7.165	< .001	0.679	1.191
Entrepreneurial Knowledge	EnK1	0.836	0.149	5.606	< .001	0.544	1.129
	EnK2	0.871	0.127	6.878	< .001	0.623	1.119
	EnK3	0.953	0.144	6.619	< .001	0.670	1.235
	EnK4	0.975	0.126	7.750	< .001	0.728	1.221
Entrepreneurial Attitude	EnA1	0.886	0.220	4.034	< .001	0.456	1.317
	EnA2	1.321	0.216	6.115	< .001	0.898	1.744
	EnA3	0.838	0.220	3.808	< .001	0.407	1.270
	EnA4	1.190	0.210	5.663	< .001	0.778	1.602
	EnA5	1.012	0.216	4.678	< .001	0.588	1.436

In addition to the estimates of the relationships between the factors and their underlying indicators, the study also analysed, based on factor covariance scores, the relationships between the three factors making up the entrepreneurial competencies construct. The result in Table 7 shows that the substantial and statistically significant covariance of 0.622 between entrepreneurial skills (EnS) and entrepreneurial knowledge (EnK) implies a robust positive association between the two constructs. This suggests that individuals exhibiting higher levels of entrepreneurial skills (EnS) are likely to possess increased entrepreneurial knowledge (EnK), and vice versa. On the other hand, the covariance of 0.026 between entrepreneurial skills (EnS) and entrepreneurial attitude (EnA) indicates a weak and statistically non-significant relationship, suggesting that changes in entrepreneurial skills (EnS) are not strongly linked to changes in entrepreneurial attitude (EnA). The covariance of 0.268 between entrepreneurial knowledge (EnK) and entrepreneurial attitude (EnA) suggests a moderate and positive association, indicating that individuals with higher levels of entrepreneurial knowledge (EnK) tend to exhibit more favourable entrepreneurial attitudes (EnA), and vice versa. These findings underscore the complex relationships in the entrepreneurial competencies' framework, providing insights for refining theoretical models and guiding further research in this domain.

Table 7
Factor Covariances

	Estimate	Std. Error	z-Value	p-Value	95% CI Lower	Upper
EnS ↔ EnK	0.622	0.104	5.971	< .001	0.418	0.827
EnS ↔ EnA	0.026	0.172	0.152	0.879	-0.310	0.362
EnK ↔ EnA	0.268	0.159	1.688	0.091	-0.043	0.579

Internal Consistency Reliabilities and Validities

The reliability and validity results shown in Table 8 indicate generally strong psychometric properties the construct of entrepreneurial competencies and its three dimensions. Entrepreneurial skills and entrepreneurial knowledge demonstrate excellent reliability with both coefficient ω and coefficient α exceeding 0.90, suggesting high internal consistency. The Average Variance Extracted (AVE) values of 0.70 for these constructs support their convergent validity, indicating that a substantial proportion of the variance in the indicators is attributable to the underlying constructs. Entrepreneurial attitude exhibits good reliability, while its AVE of 0.50 suggests acceptable convergent validity, though there may be room for improvement. Entrepreneurial competencies show outstanding reliability with a coefficient ω of 0.96, while the coefficient α of 0.85 indicates good internal consistency. Overall, these findings suggest a robust measurement model.

Table 8
Reliability and Validity Statistics

Factor/Scale	Coefficient ω	Coefficient α	AVE
Entrepreneurial Skills	0.94	0.93	0.70
Entrepreneurial Knowledge	0.91	0.90	0.70
Entrepreneurial Attitude	0.82	0.82	0.50
Entrepreneurial Competencies	0.96	0.85	

Conclusion

This study assessed the structural validity of an entrepreneurial competencies measurement model among small business owners in Zamfara State, Nigeria. The initial EFA identified three key dimensions—entrepreneurial skills, entrepreneurial knowledge, and entrepreneurial attitude—as the underlying factors of the construct. However, the subsequent CFA revealed challenges in achieving an optimal fit, as evidenced by significant chi-square statistics and suboptimal fit indices. Despite these issues, the study offers lessons in the complexities of measuring entrepreneurial competencies in the specific context of Zamfara State. The findings underscore the importance of continuous refinement and adaptation of measurement tools to better capture the various shades of entrepreneurial competencies among small business owners.

Limitations and Suggestions for Further Research

While this study contributes to the measurement of entrepreneurial competencies among Nigerian small business owners in Zamfara State, several limitations should be acknowledged. Firstly, the relatively small sample size of 45 participants may impact the generalisability of the findings to the broader population of small business owners in the region. Secondly, the measurement model faced challenges in achieving a satisfactory fit during CFA, suggesting potential issues with the chosen model or the instrument itself. Finally, external factors, such as economic conditions or cultural influences, may also impact the applicability of the results beyond the study context.

In light of the study's limitations, several avenues for future research are recommended. Firstly, using large sample size would enhance the robustness and generalisability of the findings. Secondly, incorporating qualitative methodologies, such as interviews or focus groups, could capture the qualitative subtleties of entrepreneurial experiences and shed light on the contextual factors shaping these competencies. Thirdly, given the challenges encountered in achieving a satisfactory fit during CFA, future research should consider instrument refinement or the exploration of alternative models to better capture the intricacies of entrepreneurial skills in the local context.

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