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Structural Equation Modeling on Data on Students' Knowledge and Interest in Entrepreneurship in Lampung

Sangidatus Sholiha[1], Ira Vahlia[1], Wardhani Utami Dewi[1*]
[1]Universitas Muhammadiyah Metro, Indonesia
dewiutamiwardhani@gmail.com

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ABSTRACT

Entrepreneurship plays a crucial role in economic growth and reducing unemployment, particularly in regions like Lampung, Indonesia, which face challenges such as limited entrepreneurial resources and low interest in entrepreneurship. This research aims to explore the relationship between entrepreneurial knowledge and entrepreneurial interest among students in Lampung, using Structural Equation Modeling (SEM) for analysis. A quantitative approach with a cross-sectional design was applied, involving 300 students randomly selected using simple random sampling from Lampung. The study focuses on entrepreneurial knowledge as the independent variable and entrepreneurial interest as the dependent variable. Data were collected using a questionnaire and analyzed with R Studio 4.2.1 using the lavaan package for SEM. The results show that entrepreneurial knowledge significantly influences entrepreneurial interest, explaining 86.10% of its variation. These findings suggest that strengthening entrepreneurial knowledge through curriculum development and innovative learning approaches can boost students' entrepreneurial interest. Higher education institutions in Lampung can improve entrepreneurial education by integrating practical knowledge, case studies, and mentorship programs to foster entrepreneurial attitudes. This research contributes to the growing field of entrepreneurship education and offers actionable insights for policymakers and educators to develop sustainable entrepreneurs in Lampung.

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A. INTRODUCTION

Entrepreneurship courses at universities are important for developing entrepreneurial competencies and attitudes in students (Yacine, 2021; Fanghui, 2022). The era of globalization and technological developments demands an increase in the quality of human resources that can compete in the global job market. The development of higher education drives regional economic growth (Guo, 2022). In this context, entrepreneurial skills become crucial to facing rapidly developing challenges and opportunities. The superior quality of human resources can be the main driver of economic growth in a region. Lampung has natural wealth and large economic potential, such as the agricultural, fisheries, and tourism sectors. Students, as future leaders and economic drivers, are expected to be able to explore this potential through innovation and entrepreneurship. Therefore, understanding the level of entrepreneurial knowledge and interest of students in Lampung is a critical first step in identifying opportunities and challenges that must be overcome. Global trends show a paradigm shift from job search to job creation. 2016 showed that most hiring was driven by the emergence of new

positions. In this way, students are no longer just directed to become employees but are also expected to develop into independent entrepreneurs (Kavan & Goel, 2022).

Several studies on the analysis of knowledge and interest in entrepreneurship, Hidayat & Veronica (2022) show no influence of entrepreneurial knowledge on entrepreneurial interest. Positive and significant influence of locus of control on interest in entrepreneurship. The approach uses causal associativity through quantitative descriptive techniques the Partial Least Square (PLS) method for data analysis. Another research conducted by Ilomo & Mwantimwa (2023) concluded that entrepreneurial knowledge moderates the relationship between behavioral control and entrepreneurial intentions and that attitudinal and behavioral control positively affect entrepreneurial intentions directly; the research design uses an exploratory-quantitative approach. Similar research was also carried out by Setyastanto et al. (2022), which shows that entrepreneurial knowledge significantly affects interest in entrepreneurship. This research uses quantitative research with associative research - linear regression testing and hypothesis testing.

From previous studies, no one has used the Structural Equation Modeling (SEM) method to analyze the complexity of the relationships between variables that influence students' entrepreneurial knowledge and interest. Most previous studies tend to use simpler statistical analysis, such as linear regression, which can only measure the relationship between a few variables directly. However, SEM allows more in-depth analysis by taking into account the relationship between various interrelated variables simultaneously, and can handle more complex and causal relationships. By using SEM, this research aims to fill this gap by providing a more comprehensive understanding of how entrepreneurial knowledge influences students' entrepreneurial interest, as well as other factors that may play a role. This will make a significant contribution to the development of theory and practice of entrepreneurship education. SEM is a statistical technique to test hypotheses about the causal influence between observed or latent variables (Bowen & Guo, 2011). SEM identifies linear relationships and explores deeper cause-and-effect relationships involving factors that may not be easily measurable. Furthermore, this research has a strong local context, considering Lampung's special characteristics. SEM allows researchers to test hypotheses about causal effects between observed or latent variables and is commonly used in various scientific disciplines, including psychology, education, and management (Sobaih & Elshaer, 2022). Understanding these factors at the local level provides deeper insight into students' entrepreneurial knowledge and interests, which can be used to formulate educational policies that are more effective and relevant to regional needs. This allows the researcher to test variables' direct and indirect influence on the desired outcome (Laloma et al., 2023). Thus, it is hoped that this research can significantly contribute to understanding students' entrepreneurial knowledge and interests in Lampung. It is hoped that the results of this research can provide a basis for developing more sustainable education policies and local economic development strategies. Using SEM, researchers can gain a deeper understanding of the factors influencing students' entrepreneurial knowledge and interest and inform the development of effective educational interventions and programs in this area.

Entrepreneurship courses are included in the curriculum of every study program in higher education, which is mandatory for all students (Ali, 2021). This is done to produce young

entrepreneurial candidates for the future. Empirical facts show that the number of university graduates in Indonesia has increased significantly over the last few years. Every year, thousands of students complete their higher education. However, unfortunately, this phenomenon is not always accompanied by a comparable increase in the absorption capacity of the job market. However, it should be noted that the number of young entrepreneurs in Indonesia still needs to continue to increase, and the effectiveness of entrepreneurship education in universities may vary (Arioseno et al., 2023; Octavio et al., 2023). Even though many graduates enter the world of work every year, the opportunity to get a job that suits their educational background is quite limited. As a result, the open unemployment rate in Indonesia is quite high, reaching 9-10%, including alumni of educated universities who are unemployed (Ali, 2021). To overcome this challenge, there must be cooperation between educational institutions, the government, and the industrial sector. Universities need to ensure that their curricula are relevant to the job market's needs. In contrast, government and industry need to be actively involved in creating job opportunities and increasing the absorption capacity of graduates. With such a holistic approach, it is hoped that it can reduce open unemployment and provide better opportunities for college graduates to develop their careers.

With research using the Structural Equation Modeling (SEM) method, it is hoped that it can provide a deeper understanding of the complexity of the relationships between variables that influence students' knowledge and interest in entrepreneurship in Lampung. It is hoped that the results of this research can become a reference for educational policymakers. So, it is hoped that we can create college graduates who are not only academically qualified but also ready to compete in the world of work by becoming independent entrepreneurs and able to support local economic growth.

B. METHODS

This research uses a quantitative approach with a cross-sectional research design. The research population consisted of students from Lampung province, Indonesia. A sample size of 300 students was selected using simple random sampling, ensuring that each student in the population had an equal chance of being chosen. The sample size of 300 was determined to provide a sufficient level of statistical power to detect meaningful relationships between variables, based on common guidelines for SEM and the expected effect size. The research instrument is a questionnaire, which was distributed online to students in Lampung. The questionnaire used has been tested for validity and reliability to ensure that the measuring instrument is both valid and consistent. The collected data will be processed and analyzed using the software *R Studio 4.2.1* by implementing a series of programming using the *lavaan package*. This package was developed to provide latent variable modelling such as SEM (Svetina et al., 2020). Using SEM to test the relationship between the latent variables of knowledge and interest in entrepreneurship, each indicator variable is influenced by the two latent variables. The variables used are two latent variables and 21 indicator variables, as shown in Table 1.

Table 1. Research Variables

Latent variables	Indicator variables	
Knowledge (ξ_1)	Attitudes and behavior of entrepreneurs	X_1
	Analyze business opportunities	X_2
	Analyze business aspects	X_3
	Prepare proposals for business aspects.	X_4
	Entrepreneurial education	X_5
	Market research	X_6
	Financial management skills	X_7
	Innovation and creativity	X_8
	Business law and ethics	X_9
	Communication and networking skills	X_{10}
Interest in Entrepreneurship (η_1)	Oriented to the future and dare to take risks	Y_1
	Strong belief in one's strength	Y_2
	Physical and mental endurance, perseverance, tenacity, work, and effort	Y_3
	Strong will to achieve life's goals and needs	Y_4
	Interest in business ideas	Y_5
	Entrepreneurial intentions	Y_6
	Entrepreneurial resilience	Y_7
	Business skills development	Y_8
	Positive attitude towards risk	Y_9
	Awareness of business opportunities	Y_{10}
	Readiness to face challenges	Y_{11}

The research steps carried out are as follows:

1. Structural Model Specifications and Measurements

Determine the structural model and measurements used to carry out testing. This research consists of 2 latent variables, namely Knowledge (ξ_1) and Entrepreneurial Interest (η_1), and 21 observed variables, as presented in Table 1.

2. Parameter Estimation

This research uses the Partial Least Squares (PLS) estimation method, which is carried out with the help of the R-Studio 4.2.1 program. Although the SEM method is often used to analyze complex relationships between variables, this research chose PLS because of its ability to handle more complex models with smaller samples and data that does not always meet normality assumptions.

3. Evaluation of Measurement Models

Validity testing is carried out by testing loading factors to measure construct validity. Convergent validity is considered achieved if the factor loadings or correlation coefficients $\lambda \geq$ 0.5. Hair Jr et al. (2020) which shows that these indicators have a significant relationship with the construct being measured. Meanwhile, reliability testing was carried out by measuring Composite Reliability (CR) and Average Variance Extracted (AVE). A construct is said to be reliable if the CR value is greater than 0.7 (Shrestha, 2021). CR can be determined using the following formulation:

$$\text{CR} = \frac{(\sum_{j=1}^{n} c_{ij})^2}{(\sum_{j=1}^{n} \lambda_{ij})^2 + \sum_{j=1}^{n} e_i}, \quad (1)$$

AVE can be calculated based on the following formula:

$$\text{AVE} = \frac{\sum_{j=1}^{n} \lambda_i{}^2}{\sum_{j=1}^{n} \lambda_{ij}{}^2 + \sum_{j=1}^{n} e_i}, \quad (2)$$

Where is the loading factor, and is the error value of the to-th measurement? $\lambda_{ij} e_i i e_i = 1 - \lambda_{ij}{}^2$. The measurement model was evaluated by testing factor loadings to test the validity and reliability of variables based on the above tests.

4. Evaluation of Structural Models

Evaluation of the structural model of the CRb parameter significance test and using R-Square (R^2). For example, statistics*t*bootstrap, also called Critical Ratio (CRb), can be calculated by dividing the parameter estimate by the bootstrap standard error (Musah et al., 2023). If bootstrap*t*value is equal to or greater than the critical value*t*distribution, the parameter estimates are considered statistically significant at the level α= 0.05. The parameter is considered significant if the value |CRb| > 2 (Malek & Bhatt, 2023).

5. Overall Model Fit Evaluation

Evaluation is carried out after the measurement model and structural model are significant. The FIT, AFIT, and GFI values are a reference in evaluating the overall model. The FIT value ranges from 0 to 1. Meanwhile, the GFI value that is considered good ranges from 0.9 to 1.0. A GFI value below 0.9 is considered not good and bad if it ranges below 0.8 (Sovey et al., 2022).

6. Model Respecification

This stage can also be called a modification, which is related to model respecification based on the results of the fit test in the previous stage.

C. RESULT AND DISCUSSION

1. Structural Model Specifications

Structural models describe the relationships between latent variables by presenting a series of linear regression equations (Yilmaz, 2023). The combination of these equations forms a simultaneous equation for latent variables. The parameters describing the regression of exogenous latent variables are expressed by the Greek symbol γ ("gamma"), while the regression of endogenous latent variables is symbolized by β ("beta"). The covariance matrix for the exogenous latent variables is labeled Φ ("phi"). The structural model formed is:

$$\boldsymbol{\eta_1 = + \gamma_1 \xi_1 \zeta_1} \quad (3)$$

assuming E(η) = 0, E(ξ) = 0, E(ζ) = 0; uncorrelated with $\boldsymbol{\zeta}$, ($\boldsymbol{\xi I - B}$) nonsingular.

2. Measurement Model Specifications

The measurement model evaluates the relationship between latent and measurable variables (Friderichs & Correa, 2022). Latent variables are considered factors that form the basis of related measured variables. The link between latent variables and measured variables is called factor loading, λ, which is represented by the Greek symbol (lambda). The measured variable model is:

$$
\begin{aligned}
x_1 &= \lambda_{x_{11}}\xi_1 + \delta_1 \\
x_2 &= \lambda_{x_{21}}\xi_1 + \delta_2 \\
x_3 &= \lambda_{x_{31}}\xi_1 + \delta_3 \\
x_4 &= \lambda_{x_{41}}\xi_1 + \delta_4 \\
x_5 &= \lambda_{x_{51}}\xi_1 + \delta_5 \\
x_6 &= \lambda_{x_{61}}\xi_1 + \delta_6 \\
x_7 &= \lambda_{x_{71}}\xi_1 + \delta_7 \\
x_8 &= \lambda_{x_{81}}\xi_1 + \delta_8 \\
x_9 &= \lambda_{x_{91}}\xi_1 + \delta_9 \\
x_{10} &= \lambda_{x_{101}}\xi_1 + \delta_{10}
\end{aligned}
\qquad
\begin{aligned}
y_1 &= \lambda_{y_{11}}\eta_1 + \varepsilon_1 \\
y_2 &= \lambda_{y_{21}}\eta_1 + \varepsilon_2 \\
y_3 &= \lambda_{y_{31}}\eta_1 + \varepsilon_3 \\
y_4 &= \lambda_{y_{41}}\eta_1 + \varepsilon_4 \\
y_5 &= \lambda_{y_{51}}\eta_1 + \varepsilon_5 \\
y_6 &= \lambda_{y_{61}}\eta_1 + \varepsilon_6 \\
y_7 &= \lambda_{y_{71}}\eta_1 + \varepsilon_7 \\
y_8 &= \lambda_{y_{81}}\eta_1 + \varepsilon_8 \\
y_9 &= \lambda_{y_{91}}\eta_1 + \varepsilon_9 \\
y_{10} &= \lambda_{y_{101}}\eta_1 + \varepsilon_{10} \\
y_{11} &= \lambda_{y_{111}}\eta_1 + \varepsilon_{11}
\end{aligned}
$$

assuming, $\mathrm{E}(\eta) = 0$, $\mathrm{E}(\xi) = 0$, $\mathrm{E}(\varepsilon) = 0$, $\mathrm{E}(\delta) = 0$; ε is uncorrelated with η, ξ, and δ; δ is uncorrelated with η, ξ, and ε.

3. Parameter Estimation Results

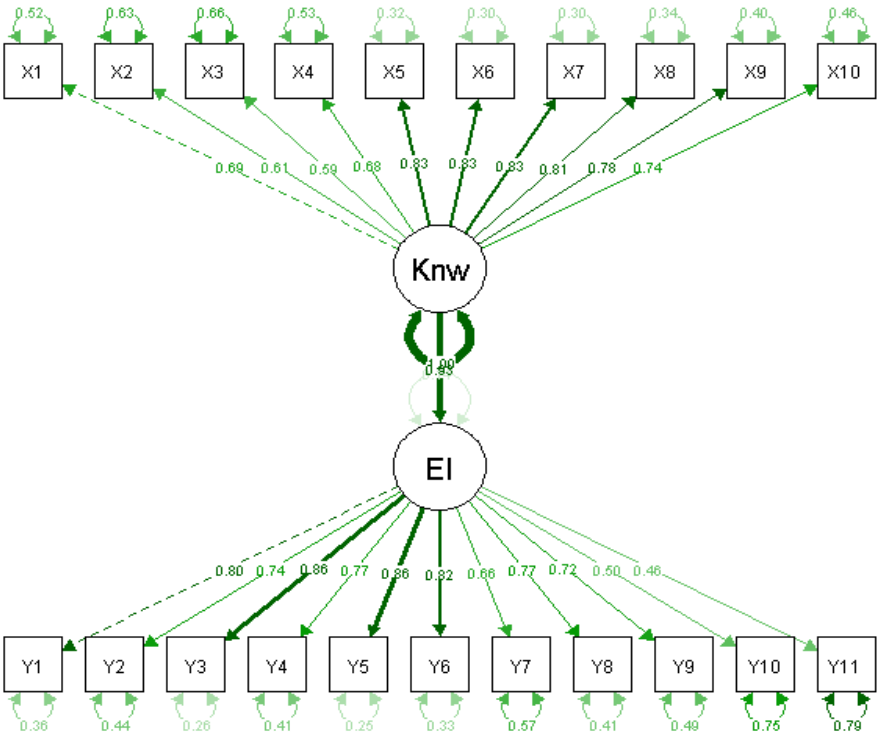

Figure 1. Parameter estimation

4. Evaluation of Measurement Models

Evaluation of the measurement model is carried out to test the relationship between indicators and latent variables through the following tests:

a. Convergent validity

Convergent validity testing is carried out by looking at the estimated loadings value; convergent validity is fulfilled if the estimated loadings value exceeds 0.5 the estimated loading values are presented in Table 2 based on the R program output.

Table 2. Estimated values of measurement model loadings

Indicator Variables	Estimate	*Std. Error*	Information
X1	0.74	0.52	Valid
X2	0.78	0.63	Valid
X3	0.81	0.66	Valid
X4	0.83	0.53	Valid
X5	0.83	0.32	Valid
X6	0.83	0.30	Valid
X7	0.83	0.30	Valid
X8	0.81	0.34	Valid
X9	0.78	0.40	Valid
X10	0.74	0.46	Valid
Y1	0.80	0.36	Valid
Y2	0.74	0.44	Valid
Y3	0.86	0.26	Valid
Y4	0.77	0.41	Valid
Y5	0.86	0.25	Valid
Y6	0.82	0.33	Valid
Y7	0.66	0.57	Valid
Y8	0.77	0.41	Valid
Y9	0.72	0.49	Valid
Y10	0.50	0.75	Invalid
Y11	0.46	0.79	Invalid

Results in Table 2 there are two indicators, Y_{10} and Y_{11}, which have estimated loading values below 0.5, so the indicator variables are declared invalid. Then, a re-run was carried out with the two indicator variables deleted to obtain the fixed parameter estimates in Figure 2.

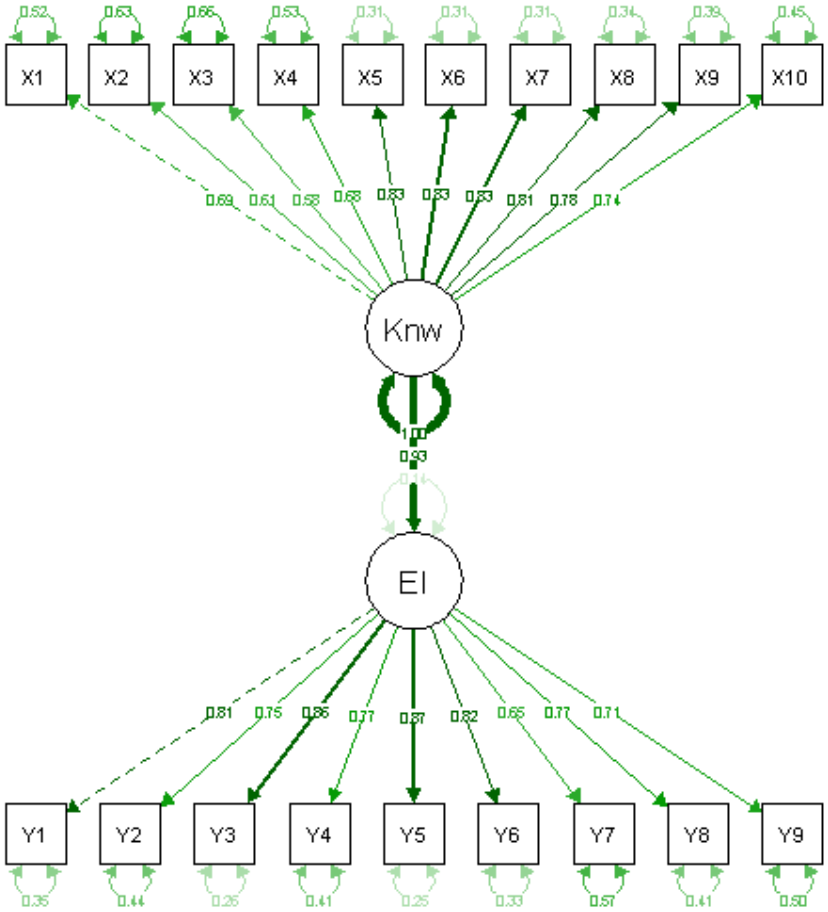

Figure 2. Parameter estimates after model respecification

b. Convergent Reliability

Assessing the suitability of the measurement model used for the final SEM, the strength of the model measurement was established by conducting reliability using CR and AVE. The recommended CR value is greater than or equal to 0.7. The following are the calculation results of the CR value of each variable based on the following CR formula. The CR and AVE values for evaluating the reliability of the measurement model are calculated using formulas (1) and (2), then presented in Table 3 below.

Table 3. CR and AVE values of the measurement model

Variable	CR	AVE
Knowledge (ξ_1)	0.92	0.55
Entrepreneurial interest (η_1)	0.93	0.61

Based on Table 3 the CR value of each latent variable measured based on the indicator variable shows a value greater than 0.7 and an AVE value greater than 0.5. This means that the variables used can be declared reliable.

c. Structural Model Evaluation

1) Parameter Significance Test

Based on the CRb calculation is carried out by dividing the parameter coefficient value obtained through parameter estimation by the standard error value. Hypothesis testing: H_0: $b_1 = 0$, namely, the knowledge variable does not have a significant effect on interest in entrepreneurship. H_1: $b_1 \neq 0$, namely, the knowledge variable has a significant effect on interest in entrepreneurship. Test Statistics: |CRb| > 2, then reject$H_0$with$\alpha = 0{,}05$.

$$\text{CRb} = \frac{b_1}{SE(b_1)} = \frac{0.93}{0.14} = 6.64 \quad (4)$$

Decision: value |CRb| > 2, namely 6.64 > 2 then rejectH_0. Conclusion: The knowledge variable has a significant effect on interest in entrepreneurship.

2) R-Square Test (R^2)

Mark R^2 is used to determine the magnitude of the influence of exogenous variables on endogenous variables in a model. In SEM, R^2 means the same as the square of the correlation that explains the proportion of the variance of the endogenous variable explained by the model. Based on models $\eta_1 = 0.93\,\xi_1 + \zeta_1$ earned value R^2 amounting to 0.8610, the latent variable of entrepreneurial interest is influenced by the knowledge variable by 86.10%, and other variables influence the rest.

5. Evaluation of Overall Model Fit

SEM estimates parameters by minimizing possible goodness-of-fit measures, such as FIT, AFIT, and GFI. The overall model evaluation can be seen from model testing as shown in Table 4.

Table 4. Evaluation of overall model fit

FIT Model Size	Target Match Level	Estimated Results	Match Level
FIT	FIT ≥ 0.50	0.59	Good
AFIT	AFIT ≥ 0.50	0.61	Good
GFI	GFI ≥ 0.90	0.96	Good

Based on Table 4, it can be seen that the FIT and AFIT values are above 0.5. Namely, FIT is 0.59, and AFIT is 0.61. The FIT value shows that the model can explain around 59% of the variation in the data, and the AFIT value of 61% is influenced by the complexity of the model, where the more variables, the higher the FIT and AFIT values. Meanwhile, for GFI, a value of 96% was obtained, indicating that the model has good suitability. So, based on the results of the overall model suitability evaluation, it can be concluded that the model used is good.

The results of this research give rise to a narrative that describes the complex relationship between knowledge and entrepreneurial interest of students in Lampung. The arguments

underlying research findings can be explained in depth by logically understanding cause and effect. It was found that students' entrepreneurial knowledge significantly influenced their interest in entrepreneurship. This can be explained as a direct result of higher education curricula that include entrepreneurship courses. Students with strong knowledge of entrepreneurship, such as business opportunity analysis, financial management, and innovation, tend to show greater interest in starting their own businesses. This approach creates a new story about how entrepreneurship education can catalyze sustainable entrepreneurial interest among students.

The main findings of this research reveal that the knowledge variable can explain as much as 86.10% of the variation in student entrepreneurial interest in Lampung Province. Factors such as business opportunity analysis, innovation, and readiness to face challenges emerge as the main drivers in forming interest in entrepreneurship. However, there is still 13.90% variation that needs to be explained, which is likely influenced by other factors, such as environmental factors, personal motivation, and social support. Environmental factors, such as regional economic conditions and the existence of supporting infrastructure, can influence students' perceptions of entrepreneurial potential. In addition, personal motivation, such as the need to achieve financial autonomy or personal achievement, as well as social support from family, friends, or mentors, also play an important role in forming interest in entrepreneurship. The relationship between these variables provides a deeper understanding of the complexity of factors that influence students in choosing an entrepreneurial path, and the importance of a holistic approach in designing effective entrepreneurship programs.

The factors leading to these results involve effective higher education interventions in developing students' entrepreneurial knowledge. A curriculum that is structured and relevant to the needs of the local job market, coupled with innovative learning approaches, can enhance the quality of human resources that are competitive in the global market. The strength of this research lies in the use of SEM, which allows for the identification of complex cause-and-effect relationships. However, the limitation of this study is the small, geographically restricted sample, which only includes students from Lampung. This localized scope means that the results should be generalized with caution, as entrepreneurial interests and behaviors may differ in other regions due to cultural, economic, and educational context variations. Therefore, further studies across diverse regions or countries are needed to validate whether these findings hold in different settings.

In comparison with previous research, this study's results align with Cui et al. (2021) and Adeel et al. (2023), which show the positive influence of entrepreneurial knowledge on entrepreneurial interest. However, this study advances the field by using SEM to explore the more complex relationships between variables. The findings suggest that focused, measurable entrepreneurship education can increase students' entrepreneurial interest, which, in turn, can drive local economic growth. When students are more inclined to become entrepreneurs, they are likely to create jobs, stimulate innovation, and boost economic activities. As such, the implementation of entrepreneurship-focused curricula in higher education could have a significant impact on local economic development by fostering entrepreneurial ecosystems.

Terms of policy implications, the results can inform the design of education policies that integrate entrepreneurship more deeply into university curricula, aligning educational content

with the evolving needs of the local and global job markets. Moreover, local economic development strategies can benefit from initiatives that support entrepreneurship, such as providing startup funding, mentorship programs, and fostering public-private partnerships. These strategies would not only enhance students' entrepreneurial skills but also contribute to the sustainable development of the regional economy, especially in Lampung, Indonesia.

D. CONCLUSION AND SUGGESTIONS

The conclusions of this research highlight a complex relationship between students' entrepreneurial knowledge and their interest in entrepreneurship in Lampung. Knowledge gained through entrepreneurship courses significantly influences students' entrepreneurial interests, with factors such as business opportunity analysis, innovation, and readiness to face challenges playing key roles. The study suggests that a well-structured and relevant curriculum is essential for enhancing human resources capable of competing globally. However, the research's limited sample of Lampung students means the results should be generalized with caution, as local context may affect entrepreneurial interest. Policy recommendations include the development of a more focused entrepreneurship curriculum that integrates practical training, mentorship, and partnerships with local businesses. This approach could foster entrepreneurial skills, leading to job creation, innovation, and local economic growth. These findings provide a basis for education policies and local economic strategies to support sustainable entrepreneurial growth and contribute to the welfare of the Lampung community.

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