

Digital Service Ecosystem Development through Strategic Entrepreneurship and University-Industry Partnerships

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Article Info

Article history:

Submission June 4, 2026

Revised August 19, 2026

Accepted October 23, 2026

Published October 29, 2026

Keywords:

Strategic Global Entrepreneurship

University–Industry Partnerships

Innovation Ecosystem

Higher Education

Partial Least Squares Structural

Equation Modeling



ABSTRACT

The role of higher education institutions in fostering innovation ecosystems has become increasingly important in the context of global economic transformation. However, empirical studies examining the combined influence of strategic global entrepreneurship and university–industry partnerships on innovation ecosystem performance remain limited, particularly in emerging economies. **This study aims** to investigate the impact of Strategic Global Entrepreneurship and University–Industry Partnerships on Innovation Ecosystem Performance in Indonesian higher education institutions. **A quantitative approach** was employed using a cross-sectional survey design, with data collected from 182 respondents, including lecturers, innovation managers, startup founders, and industry partners. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The **results** indicate that both Strategic Global Entrepreneurship and University-Industry Partnerships have a positive and significant effect on Innovation Ecosystem Performance. Notably, university–industry partnerships demonstrate a stronger influence, highlighting the importance of collaborative mechanisms in driving innovation outcomes. **This study contributes** to the literature by integrating both constructs into a unified empirical model and provides practical insights for universities and policymakers in strengthening innovation ecosystems in emerging economies.

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DOI: <https://doi.org/10.34306/ijcitsm.v6i2.288>

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1. INTRODUCTION

In recent decades, the role of higher education institutions in fostering innovation ecosystems has become increasingly significant, particularly in the context of global economic transformation and knowledge-based development. Universities are no longer perceived solely as centers of education and research but have evolved into key actors within broader innovation systems, contributing to entrepreneurial activities, technology transfer, and collaborative networks [1]. This transformation has intensified the need for stronger integration between academia and industry, especially in emerging economies where innovation ecosystems are still developing.

Strategic global entrepreneurship has emerged as a critical driver in enhancing the competitiveness and innovation capacity of higher education institutions [2]. It emphasizes the ability of organizations to leverage global opportunities, engage in cross-border collaborations, and adopt entrepreneurial strategies that transcend

local boundaries [3]. Recent studies published between 2022 and 2026 have examined the relationships among entrepreneurial orientation, international knowledge networks, university–industry collaboration, and innovation performance [4]. These studies provide an updated empirical foundation for understanding how global entrepreneurial strategies and collaborative partnerships contribute to innovation ecosystems [5].

Simultaneously, university–industry partnerships have been widely recognized as a cornerstone of innovation ecosystems. These partnerships facilitate knowledge exchange, joint research initiatives, and the commercialization of academic outputs, thereby strengthening innovation performance [6]. The Triple Helix model further emphasizes the interaction between universities, industry, and government as a fundamental mechanism for fostering innovation [7]. Empirical studies suggest that effective collaboration between academia and industry enhances technological innovation, improves research productivity, and accelerates economic development [8].

Despite the growing body of literature, existing studies tend to examine strategic entrepreneurship and university–industry collaboration in isolation rather than as integrated components of a unified innovation ecosystem. Many studies focus primarily on the relationship between entrepreneurial orientation and firm performance [9]. As a result, there remains a lack of comprehensive empirical models that simultaneously capture the combined effects of strategic global entrepreneurship and partnerships on innovation ecosystem performance.

Moreover, much of the empirical evidence in this domain is concentrated in developed economies such as the United States, Europe, and China. These contexts differ significantly from emerging economies, where institutional structures, resource availability, and innovation capabilities are still evolving [10]. In countries like Indonesia, higher education institutions face unique challenges, including limited industry engagement, insufficient global integration, and underdeveloped innovation infrastructures [11]. Consequently, findings from developed countries may not be directly applicable, highlighting the need for context-specific empirical investigations.

Furthermore, prior research often incorporates mediating variables such as knowledge transfer, absorptive capacity, or innovation capability to explain the relation [12]. While these approaches provide valuable insights, they may obscure the direct influence of strategic entrepreneurship and partnerships on innovation ecosystem performance [13]. There is therefore a need for empirical studies that examine these relationships more directly to provide clearer theoretical and practical implications. Addressing these gaps, this study formulates two research questions:

- RQ1: What extent does Strategic Global Entrepreneurship influence Innovation Ecosystem Performance in Indonesian higher education institutions?
- RQ2: What extent do University–Industry Partnerships influence Innovation Ecosystem Performance?

These questions highlight the need for an integrated empirical investigation of global entrepreneurial strategies and university–industry collaboration within emerging innovation ecosystems. Therefore, this study examines the effects of Strategic Global Entrepreneurship and University–Industry Partnerships on Innovation Ecosystem Performance using PLS-SEM. This research contributes to innovation ecosystem literature by providing a framework that explains the relationships among key variables. Furthermore, from a digital service management perspective, the findings provide a foundation for developing collaborative digital service ecosystems through digital knowledge-sharing platforms, data-driven innovation services, and secure collaboration mechanisms that support information exchange, resource integration, and research commercialization. These digital capabilities are considered potential applications of the proposed framework rather than technologies empirically tested in this study.

This study advances the existing literature by integrating Strategic Global Entrepreneurship (SGE) and University–Industry Partnerships (UIP) into a unified empirical framework for explaining Innovation Ecosystem Performance (IEP) in Indonesian higher education institutions [14]. Unlike studies that examine entrepreneurial orientation or university–industry collaboration separately, this framework simultaneously evaluates their direct contributions to innovation ecosystem performance [15]. Its distinctive contribution lies in examining global entrepreneurial orientation alongside institutional collaboration within an emerging-economy context, thereby extending the application of entrepreneurship and Triple Helix perspectives to higher education innovation ecosystems [16]. The framework provides a basis for understanding how international strategic orientation and interorganizational collaboration jointly contribute to innovation outcomes [17]. Second, it

provides empirical evidence from Indonesia, contributing to the limited literature on innovation ecosystems in emerging economies [18]. Third, it offers practical insights for policymakers, universities, and industry stakeholders in designing effective collaboration strategies to enhance innovation performance.

2. LITERATURE REVIEW

2.1. Strategic Global Entrepreneurship

Strategic global entrepreneurship (SGE) refers to the integration of entrepreneurial orientation with strategic management in a global context, enabling organizations to identify and exploit international opportunities while sustaining competitive advantage [19]. Within higher education institutions, SGE is reflected in activities such as international research collaboration, global startup incubation, and participation in cross-border innovation networks. Previous studies have emphasized that global entrepreneurial orientation enhances innovation by facilitating access to diverse knowledge sources and expanding market reach [20]. The ability to operate across borders allows institutions to integrate heterogeneous knowledge, which is a key driver of innovation outcomes [21]. Furthermore, global entrepreneurship encourages risk-taking, proactiveness, and innovation dimensions that are strongly associated with improved organizational performance [22].

In the context of higher education, SGE enables universities to transition from traditional knowledge producers to entrepreneurial institutions that actively contribute to innovation ecosystems [23]. Universities engaging in global entrepreneurial strategies are more likely to produce high-impact research, foster startup creation, and enhance technology commercialization [24]. Additionally, international collaboration strengthens institutional capabilities by enabling knowledge exchange and resource sharing across borders [25].

Despite these advantages, empirical studies examining the direct impact of strategic global entrepreneurship on innovation ecosystem performance remain limited, particularly in emerging economies [26]. Most prior research has focused on firm-level analysis rather than higher education institutions, leaving a gap in understanding how SGE influences broader innovation systems [27]. Based on this discussion, it is proposed that:

H1: Strategic Global Entrepreneurship has a positive and significant effect on Innovation Ecosystem Performance.

2.2. University–Industry Partnerships

University–industry partnerships (UIP) represent collaborative relationships between academic institutions and industry actors aimed at enhancing knowledge transfer, innovation, and economic development [28]. These partnerships encompass various forms of collaboration, including joint research projects, internships, consultancy, and co-development of technologies. Theoretical foundations of UIP are often rooted in the Triple Helix model, which highlights the interaction between universities, industry, and government as a driver of innovation [29]. Through these interactions, universities contribute scientific knowledge, industries provide practical applications and resources, and governments facilitate regulatory support and policy frameworks.

Empirical evidence suggests that strong university–industry collaboration significantly enhances innovation outcomes. For instance, collaborative research initiatives have been shown to improve research productivity and increase the likelihood of commercialization [29]. Similarly, industry engagement in academic activities supports the development of relevant skills and fosters innovation-driven education [30]. Partnerships enable effective knowledge transfer, which is a critical mechanism for innovation [31]. Firms benefit from access to cutting-edge research, while universities gain insights into market needs and technological trends. This bidirectional exchange of knowledge strengthens the overall innovation ecosystem and accelerates the development of new products and services.

However, challenges such as misaligned objectives, cultural differences, and institutional barriers often hinder the effectiveness of university–industry collaboration, particularly in developing countries [32]. These challenges highlight the need for empirical investigation into how such partnerships contribute to innovation ecosystem performance in specific contexts [33]. Therefore, it is hypothesized that:

H2: University–Industry Partnerships have a positive and significant effect on Innovation Ecosystem Performance.

2.3. Innovation Ecosystem Performance

Innovation ecosystem performance refers to the effectiveness of interactions among various actors, such as universities, industry, government, and entrepreneurs in generating innovation outputs and economic

value. It encompasses multiple dimensions, including knowledge creation, technology transfer, startup formation, and collaborative innovation activities [34]. A well-functioning innovation ecosystem is characterized by strong linkages among stakeholders, efficient knowledge flows, and the ability to transform ideas into commercially viable innovations [35]. Higher education institutions play a central role in this ecosystem by acting as knowledge hubs and facilitating collaboration among different actors.

Prior studies have shown that both entrepreneurial activities and collaborative networks are critical drivers of innovation ecosystem performance [36]. Entrepreneurial orientation contributes to opportunity recognition and innovation generation, while partnerships enhance resource mobilization and knowledge exchange [37]. However, the combined influence of these factors within a unified framework has not been extensively explored. In emerging economies, innovation ecosystem performance is often constrained by limited resources, weak institutional support, and low levels of collaboration [38]. As a result, understanding the key drivers of ecosystem performance is essential for designing effective policies and strategies.

2.4. Conceptual Framework

This study adopts an integrated theoretical framework combining the strategic entrepreneurship perspective and the Triple Helix model [39]. The strategic entrepreneurship perspective explains how Strategic Global Entrepreneurship (SGE) enables higher education institutions to identify global opportunities, mobilize international resources, and develop entrepreneurial capabilities [40]. Meanwhile, the Triple Helix model explains how University–Industry Partnerships (UIP) facilitate knowledge exchange, resource integration, and collaborative innovation. Integrating these perspectives provides a theoretical explanation of how institutional entrepreneurial orientation and external collaborative relationships contribute to Innovation Ecosystem Performance (IEP). Accordingly, SGE and UIP are conceptualized as complementary drivers of IEP, leading to the proposed hypotheses H1 and H2. Strategic Global Entrepreneurship and University–Industry Partnerships serve as the two principal predictors of Innovation Ecosystem Performance [41].

Strategic Global Entrepreneurship is grounded in the entrepreneurial orientation and strategic management perspectives, emphasizing international opportunity recognition, global networking, and cross-border innovation [42]. University–Industry Partnerships are grounded in the Triple Helix perspective, which explains how interaction among universities, industry, and government supports knowledge exchange and innovation [43]. These theoretical perspectives inform the two proposed direct relationships: H1, Strategic Global Entrepreneurship positively influences Innovation Ecosystem Performance; and H2, University–Industry Partnerships positively influence Innovation Ecosystem Performance [44].

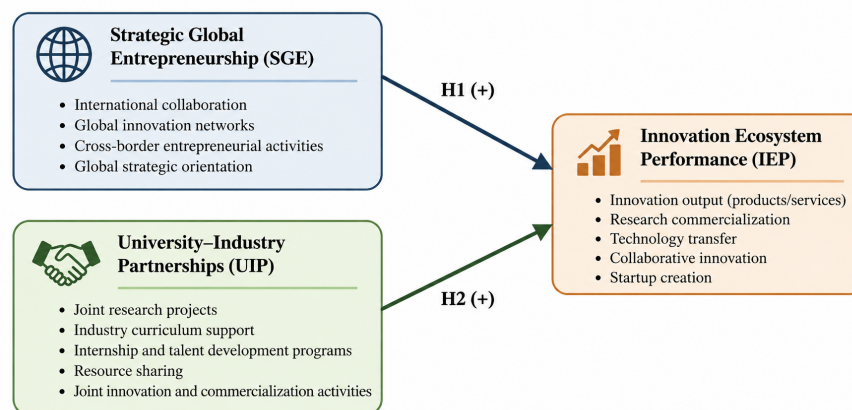


Figure 1. Conceptual Model of Innovation Performance

Figure 1 illustrates the conceptual framework proposed in this study, presenting the hypothesized relationships between Strategic Global Entrepreneurship (SGE), University–Industry Partnerships (UIP), and Innovation Ecosystem Performance (IEP). The framework depicts two direct relationships: the influence of Strategic Global Entrepreneurship on Innovation Ecosystem Performance (H1) and the influence of University–Industry Partnerships on Innovation Ecosystem Performance (H2). The figure presents the proposed research model with clearly defined constructs and directional paths to demonstrate the expected relationships among variables.

3. METHODOLOGY

3.1. Research Design

This study adopts a quantitative research approach to examine the relationships between Strategic Global Entrepreneurship, University–Industry Partnerships, and Innovation Ecosystem Performance. A cross-sectional survey design is employed to collect data from respondents at a single point in time. This approach is appropriate as the study aims to examine the hypothesized relationships between latent variables using statistical modeling.

To analyze the proposed relationships, this study utilizes PLS-SEM. PLS-SEM is considered suitable for this research due to its ability to handle complex models, predictive analysis, and relatively small to medium sample sizes. Additionally, PLS-SEM does not require strict assumptions of data normality, making it appropriate for social science research involving perceptual data.

3.2. Population and Sample

The population of this study consists of individuals involved in higher education innovation ecosystems in Indonesia. These include university lecturers, research and innovation managers, startup founders affiliated with university incubators, and industry partners collaborating with higher education institutions.

A purposive sampling technique is employed to ensure that respondents possess relevant experience and knowledge related to entrepreneurship, collaboration, and innovation activities. The selection criteria require respondents to be actively engaged in innovation-related activities within higher education institutions or to have direct involvement in university–industry collaboration. The minimum sample size for this study is set at 100 respondents. However, to ensure statistical robustness and improve model stability, this study targets between 150 and 300 respondents.

3.3. Data Collection Procedure

Data are collected using a structured questionnaire distributed through an online platform. The questionnaire is measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). This approach enables the measurement of respondents' perceptions regarding entrepreneurship, collaboration, and innovation. The structured format of the questionnaire ensures that all respondents receive the same set of questions and response options, thereby improving the consistency and comparability of the collected data. Each statement is designed to represent specific dimensions of the research variables and is formulated based on the conceptual framework and relevant previous studies. The use of an online platform also facilitates efficient data collection and enables respondents to complete the questionnaire according to their availability.

Before distribution, the instrument is reviewed to ensure clarity and contextual relevance. Respondents are informed about the purpose of the study and confidentiality is guaranteed. The review process focuses on the wording, sequence, and comprehensibility of each questionnaire item to minimize potential ambiguity and misinterpretation. In addition, the respondents are provided with clear instructions regarding how to complete the questionnaire and select the response that best represents their perceptions. Participation is voluntary, and the collected responses are used solely for academic and research purposes. These procedures are implemented to maintain the quality of the data collection process and to ensure that the responses accurately reflect the perceptions of the respondents.

3.4. Measurement of Variables

All constructs in this study are modeled as reflective constructs, in which the observed indicators are assumed to represent the underlying latent variables. The measurement items were adapted from established prior studies and subsequently adjusted to ensure their relevance to the context of higher education institutions in Indonesia. The adaptation process was intended to maintain the conceptual meaning of each construct while improving contextual suitability and clarity for the respondents. Each item was measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), allowing respondents to indicate their level of agreement with statements related to Strategic Global Entrepreneurship, University–Industry Partnerships, and Innovation Ecosystem Performance. Table 1 presents the measurement items and corresponding indicator codes used to operationalize each construct in this study.

Table 1. Measurement Items of Variables

Variable	Code	Measurement Item
Strategic Global Entrepreneurship (SGE)	SGE1	Our institution actively engages in international collaboration
	SGE2	Our institution explores global market opportunities
	SGE3	Our institution participates in global innovation networks
	SGE4	Our institution supports cross-border entrepreneurial activities
	SGE5	Our institution adopts global strategies in innovation development
University-Industry Partnerships (UIP)	UIP1	Our institution collaborates with industry in research projects
	UIP2	Industry partners are involved in curriculum development
	UIP3	Our institution provides internship programs with industry
	UIP4	There is strong resource sharing between university and industry
	UIP5	Joint innovation activities are frequently conducted
Innovation Ecosystem Performance (IEP)	IEP1	Our institution produces innovative products or services
	IEP2	Research outputs are successfully commercialized
	IEP3	Technology transfer activities are effective
	IEP4	Collaboration leads to tangible innovation outcomes
	IEP5	Our institution contributes to startup creation

Table 1 presents the measurement items used to evaluate the three main constructs in this study: Strategic Global Entrepreneurship (SGE), University-Industry Partnerships (UIP), and Innovation Ecosystem Performance (IEP). Each construct is measured using five indicators adapted to the context of higher education institutions. The SGE indicators capture global collaboration, market opportunities, innovation networks, cross-border entrepreneurship, and global innovation strategies. The UIP indicators assess research collaboration, curriculum involvement, internship programs, resource sharing, and joint innovation activities, while the IEP indicators measure innovation outputs, commercialization, technology transfer, collaborative outcomes, and startup creation.

3.5. Data Analysis Technique

Data analysis was conducted using SmartPLS 4.0 through a two-stage procedure consisting of measurement model evaluation and structural model evaluation. The measurement model was assessed to examine construct validity and reliability using indicator loadings, Average Variance Extracted (AVE), Composite Reliability, Cronbach's Alpha, and discriminant validity criteria. Convergent validity was evaluated based on outer loadings and AVE values, with recommended thresholds of 0.70 and 0.50, respectively. Reliability was confirmed through Composite Reliability and Cronbach's Alpha values exceeding 0.70, while discriminant validity was assessed using the Fornell-Larcker criterion and Heterotrait-Monotrait (HTMT) ratio, with HTMT values below 0.90 indicating adequate discriminant validity. The questionnaire items, original sources, and adaptations for the Indonesian higher education context were documented to ensure methodological transparency.

The structural model evaluation was performed by examining path coefficients, coefficient of determination (R^2), effect sizes (f^2), predictive relevance (Q^2), and collinearity diagnostics using the Variance Inflation Factor (VIF). Hypothesis testing was conducted through bootstrapping with 5,000 resamples to determine the significance of the proposed relationships and estimate 95% bootstrap confidence intervals. A hypothesis was considered supported when the t-statistic exceeded 1.96 and the p-value was below 0.05. Additionally, the analysis included an assessment of common method bias and missing-data treatment procedures to strengthen the robustness and reliability of the research findings.

4. RESULTS

4.1. Respondent Profile

A total of 182 valid responses were collected and analyzed in this study. The respondents consisted of lecturers, innovation managers, startup founders, and industry partners affiliated with higher education institutions in Indonesia. The majority of respondents were lecturers (52%), followed by innovation managers (21%),

startup founders (15%), and industry partners (12%). In terms of experience, most respondents had more than five years of involvement in innovation or collaboration activities, indicating a high level of relevance and credibility of the data.

4.2. Measurement Model Evaluation

The measurement model was evaluated to assess the validity and reliability of Strategic Global Entrepreneurship (SGE), University–Industry Partnerships (UIP), and Innovation Ecosystem Performance (IEP). As reflective constructs, the evaluation included indicator reliability, convergent validity, internal consistency reliability, and discriminant validity using outer loadings, AVE, Composite Reliability, Cronbach’s Alpha, the Fornell–Larcker criterion, and HTMT ratio. This evaluation ensures that the constructs adequately represent their indicators before structural model assessment and hypothesis testing.

4.3. Convergent Validity

Convergent validity was evaluated by examining outer loadings and Average Variance Extracted (AVE). All indicator loadings exceeded the recommended threshold of 0.70, indicating strong indicator reliability. The AVE values for Strategic Global Entrepreneurship (SGE), University–Industry Partnerships (UIP), and Innovation Ecosystem Performance (IEP) were above the minimum requirement of 0.50, confirming that each construct explained more than half of the variance of its indicators.

Table 2. Outer Loadings and AVE

Variable	Indicator	Loading	AVE
SGE	SGE1	0.812	0.642
	SGE2	0.845	
	SGE3	0.801	
	SGE4	0.779	
	SGE5	0.821	
UIP	UIP1	0.834	0.668
	UIP2	0.856	
	UIP3	0.812	
	UIP4	0.798	
	UIP5	0.827	
IEP	IEP1	0.841	0.681
	IEP2	0.864	
	IEP3	0.809	
	IEP4	0.835	
	IEP5	0.822	

The results presented in Table 2 demonstrate satisfactory convergent validity across all constructs. All indicators have outer loading values above the recommended threshold of 0.70, indicating adequate representation of their respective latent constructs. The SGE construct shows outer loadings ranging from 0.779 to 0.845 with an AVE of 0.642, while UIP records outer loadings between 0.798 and 0.856 with an AVE of 0.668. Meanwhile, IEP demonstrates the highest AVE value of 0.681, with outer loadings ranging from 0.809 to 0.864. All AVE values exceed the threshold of 0.50, confirming that each construct explains more than half of the variance of its indicators. Therefore, the measurement model meets the criteria for convergent validity and supports further structural model analysis.

4.4. Reliability Analysis

Internal consistency reliability was assessed using Composite Reliability and Cronbach’s Alpha. These measurements were applied to evaluate the degree of consistency among the indicators representing each construct and to ensure that the measurement items reliably capture the intended latent variables. Composite Reliability provides an estimation of the overall reliability of the construct by considering the contribution of each indicator, while Cronbach’s Alpha evaluates the internal correlation among the measurement items. The assessment results indicate whether the constructs achieve an acceptable level of reliability and demonstrate that the indicators consistently measure the same underlying concept. Therefore, the reliability evaluation confirms the adequacy and stability of the measurement model for further structural analysis.

Table 3. Reliability Results

Variable	Cronbach's Alpha	Composite Reliability
SGE	0.881	0.912
UIP	0.892	0.919
IEP	0.887	0.915

The results presented in Table 3 indicate that all constructs meet the recommended reliability criteria. The SGE construct has a Cronbach's Alpha value of 0.881 and a Composite Reliability value of 0.912. The UIP construct records a Cronbach's Alpha of 0.892 and a Composite Reliability of 0.919, while the IEP construct has a Cronbach's Alpha of 0.887 and a Composite Reliability of 0.915. All Cronbach's Alpha values are above the recommended threshold of 0.70, indicating high internal consistency among the indicators within each construct. Similarly, all Composite Reliability values exceed 0.70, further confirming the reliability of the measurement instruments. Therefore, the SGE, UIP, and IEP constructs demonstrate satisfactory internal consistency and are considered reliable for further analysis.

All values exceed the recommended threshold of 0.70, indicating strong reliability. This result demonstrates that the measurement indicators consistently represent their respective constructs and possess a high level of internal consistency. The reliability assessment confirms that the observed variables provide stable and dependable measurements for evaluating the proposed research model. Furthermore, the satisfactory values of Composite Reliability and Cronbach's Alpha indicate that the constructs meet the recommended reliability criteria, ensuring that the measurement instruments are appropriate for further structural model analysis. Therefore, the reliability results support the robustness of the measurement model and enhance confidence in the validity of the empirical findings.

4.5. Discriminant Validity

Discriminant validity was assessed using the Fornell–Larcker criterion to determine whether each construct is empirically distinct from other constructs within the research model. This approach compares the square root of the Average Variance Extracted (AVE) for each construct with its correlations with other latent variables. Adequate discriminant validity is established when the square root of AVE exceeds the corresponding inter-construct correlations, indicating that each construct shares more variance with its own indicators than with other constructs. The assessment was conducted for Strategic Global Entrepreneurship (SGE), University–Industry Partnerships (UIP), and Innovation Ecosystem Performance (IEP), with the results presented in Table 4.

Table 4. Fornell–Larcker Criterion

Variable	SGE	UIP	IEP
SGE	0.801		
UIP	0.642	0.817	
IEP	0.598	0.671	0.826

As presented in Table 4, the square roots of AVE for SGE, UIP, and IEP were 0.801, 0.817, and 0.826, respectively. These diagonal values exceeded the corresponding inter-construct correlations, including SGE–UIP (0.642), SGE–IEP (0.598), and UIP–IEP (0.671). The highest inter-construct correlation was observed between UIP and IEP (0.671), which remained below their respective square roots of AVE. These findings demonstrate that the three constructs satisfy the Fornell–Larcker criterion, providing evidence of adequate discriminant validity. Accordingly, Strategic Global Entrepreneurship, University–Industry Partnerships, and Innovation Ecosystem Performance can be considered empirically distinct within the proposed measurement model, supporting their suitability for subsequent structural model evaluation.

4.6. Structural Model Evaluation

The structural model was assessed to evaluate the relationships between constructs, including path coefficients, coefficient of determination (R^2), and hypothesis testing. This assessment aims to determine the strength and significance of the proposed relationships among latent variables and to evaluate the explanatory power of the research model. Path coefficients were analyzed to identify the direction and magnitude of the effects between constructs, while the coefficient of determination (R^2) was used to measure how well

the independent variables explain the variance of the dependent constructs. Furthermore, hypothesis testing was conducted through bootstrapping procedures to examine the statistical significance of the proposed relationships based on the obtained t-values and p-values. The results of the structural model evaluation provide empirical evidence regarding the validity of the proposed theoretical framework and support the interpretation of relationships among the investigated constructs.

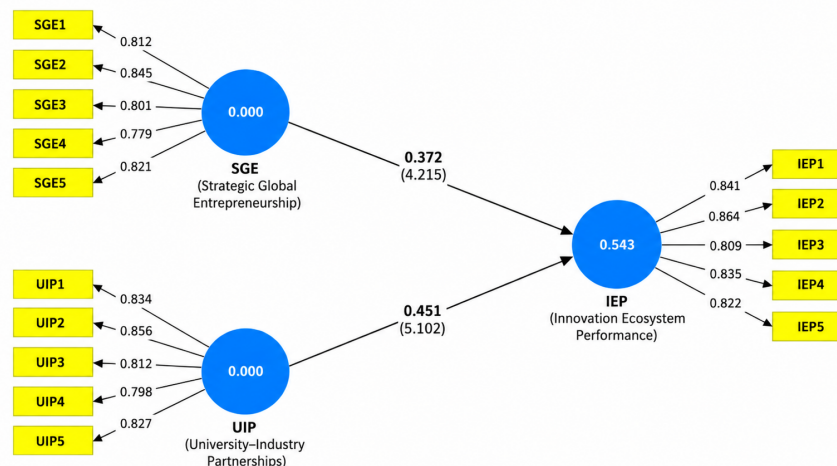


Figure 2. PLS-SEM Structural Model

Figure 2 illustrates the PLS-SEM structural model comprising Strategic Global Entrepreneurship (SGE), University-Industry Partnerships (UIP), and Innovation Ecosystem Performance (IEP). The reconstructed model presents the reported outer loadings for 15 measurement indicators and the structural path coefficients of 0.372 for SGE and 0.451 for UIP. The coefficient of determination ($R^2 = 0.543$) indicates that both predictor constructs collectively explain 54.3% of the variance in Innovation Ecosystem Performance. These results provide a visual representation of the relationships examined in the study, with further statistical details presented in Table 5.

Table 5. R^2 Results

Endogenous Variable	R^2
Innovation Ecosystem Performance (IEP)	0.543

Table 5 presents the coefficient of determination (R^2) for the endogenous variable, Innovation Ecosystem Performance (IEP). The results show an R^2 value of 0.543, indicating that 54.3% of the variance in Innovation Ecosystem Performance can be explained by the predictor variables included in the structural model. Meanwhile, the remaining 45.7% of the variance is attributable to other factors that are not included in the model. The R^2 value of 0.543 indicates a moderate level of explanatory power, demonstrating that the structural model provides a meaningful explanation of Innovation Ecosystem Performance. Therefore, the model has adequate predictive explanatory capability for the IEP construct.

The R^2 value of 0.543 indicates that Strategic Global Entrepreneurship and University-Industry Partnerships explain 54.3% of the variance in Innovation Ecosystem Performance, which can be considered moderate. This finding suggests that both Strategic Global Entrepreneurship and University-Industry Partnerships make a meaningful contribution to the development and performance of the innovation ecosystem. The remaining 45.7% of the variance is attributable to other factors that are not included in the current model, indicating that Innovation Ecosystem Performance may also be influenced by additional organizational, institutional, technological, and environmental factors. Therefore, the moderate R^2 value demonstrates that the proposed model provides a reasonably strong explanatory capacity while also highlighting the potential for future research to incorporate other relevant determinants to obtain a more comprehensive understanding of Innovation Ecosystem Performance.

4.7. Hypothesis Testing

Hypothesis testing was conducted using bootstrapping with 5,000 resamples. This procedure was employed to assess the statistical significance of the hypothesized relationships and to obtain more robust estimates of the path coefficients. The bootstrapping approach generated empirical sampling distributions for each parameter, allowing the significance of the proposed hypotheses to be evaluated based on the resulting T-statistics and P-values. A hypothesis was considered statistically significant when the T-statistic exceeded 1.96 and the P-value was below 0.05, using a two-tailed significance test. The results of the hypothesis testing are presented in Table 6.

Table 6. Path Coefficients and Hypothesis Testing

Hypothesis	Path	Coefficient	T-Statistic	P-Value	Result
H1	SGE → IEP	0.372	4.215	0.000	Supported
H2	UIP → IEP	0.451	5.102	0.000	Supported

The results of the path coefficient analysis and hypothesis testing are presented in Table 6. Both hypotheses were statistically supported. H1 demonstrated a positive and significant relationship between Strategic Global Entrepreneurship (SGE) and Innovation Ecosystem Performance (IEP), with a path coefficient of 0.372, a T-statistic of 4.215, and a P-value below 0.001. Similarly, H2 indicated a positive and significant relationship between University–Industry Partnerships (UIP) and IEP, with a path coefficient of 0.451, a T-statistic of 5.102, and a P-value below 0.001. The higher coefficient of UIP compared to SGE (0.451 vs. 0.372) suggests a stronger estimated positive association with IEP within the proposed model. This relationship may reflect the importance of university–industry collaboration mechanisms, including joint research, resource sharing, industry involvement, and technology commercialization, while SGE contributes through international networking, global opportunities, and entrepreneurial capabilities. Nevertheless, the difference between the two path coefficients should be interpreted descriptively, as further statistical testing is required to determine whether their magnitudes differ significantly. Overall, these findings provide empirical support for the proposed relationships between SGE, UIP, and IEP, although the cross-sectional research design limits causal interpretation.

4.8. Interpretation of Results

The results indicate that Strategic Global Entrepreneurship has a positive and significant effect on Innovation Ecosystem Performance. This finding suggests that higher education institutions that actively engage in global entrepreneurial activities, such as international collaboration and cross-border innovation, are more likely to enhance their innovation outcomes. The ability to access global knowledge networks and leverage international opportunities plays a crucial role in strengthening innovation ecosystems.

Furthermore, University–Industry Partnerships also show a positive and significant effect on Innovation Ecosystem Performance, with a stronger coefficient compared to Strategic Global Entrepreneurship. This indicates that collaboration between universities and industry is a key driver of innovation outcomes. Effective partnerships facilitate knowledge transfer, resource sharing, and joint innovation activities, which contribute directly to improved ecosystem performance.

Overall, the findings highlight that both global entrepreneurial orientation and collaborative partnerships are critical factors in advancing innovation ecosystems within higher education institutions in Indonesia. The relatively higher impact of University–Industry Partnerships suggests that strengthening collaboration mechanisms may provide immediate and tangible benefits for innovation performance.

5. DISCUSSION

5.1. Interpretation of Findings

The findings of this study demonstrate that both Strategic Global Entrepreneurship (SGE) and University–Industry Partnerships (UIP) have a positive and significant effect on Innovation Ecosystem Performance (IEP). These results provide empirical support for the argument that innovation ecosystems in higher education are shaped not only by internal capabilities but also by external strategic orientation and collaborative networks.

The significant effect of Strategic Global Entrepreneurship indicates that higher education institutions that actively engage in global entrepreneurial activities are better positioned to enhance their innovation outcomes. This finding aligns with the perspective that global orientation enables access to diverse knowledge sources, international networks, and broader market opportunities, all of which contribute to innovation

performance. In the context of Indonesia, where higher education institutions are increasingly encouraged to internationalize, this result suggests that global engagement is a critical factor in strengthening innovation ecosystems.

Furthermore, the results reveal that University–Industry Partnerships have a stronger influence on Innovation Ecosystem Performance compared to Strategic Global Entrepreneurship. The path coefficient of University–Industry Partnerships ($\beta = 0.451$) is higher than Strategic Global Entrepreneurship ($\beta = 0.372$), indicating a stronger estimated direct relationship within the proposed model. From the Triple Helix perspective, this difference may be attributed to direct university–industry interactions through joint research, resource sharing, industry-oriented curriculum development, internships, and collaborative innovation activities. These mechanisms facilitate knowledge transfer and enable academic research to be transformed into practical applications.

In contrast, Strategic Global Entrepreneurship contributes through international networking, global knowledge access, and cross-border innovation activities, although its impact may depend on institutional capabilities to establish effective global collaborations. These findings suggest that direct collaboration between universities and industry provides a more immediate pathway for improving innovation outcomes through knowledge exchange, resource integration, and joint problem-solving. However, the cross-sectional design limits causal interpretation, and further comparative studies are needed to examine whether these relationship patterns remain consistent across different institutional and national contexts.

5.2. Comparison with Previous Studies

The findings of this study are consistent with prior research that highlights the importance of global entrepreneurship in enhancing innovation performance. Previous studies have emphasized that organizations with strong global entrepreneurial orientation tend to achieve higher levels of innovation due to their ability to leverage international knowledge and opportunities. This study extends these findings by demonstrating that such effects are also evident within higher education institutions, particularly in emerging economies. Similarly, the significant impact of University–Industry Partnerships supports existing literature that identifies collaboration as a key driver of innovation. Prior studies have shown that joint research, industry engagement, and knowledge exchange contribute to improved innovation outcomes. The present study reinforces these findings by providing empirical evidence that partnerships play a dominant role in shaping innovation ecosystem performance. However, this study also contributes to the literature by integrating both Strategic Global Entrepreneurship and University–Industry Partnerships within a single empirical model. While previous studies often examine these variables separately, this research demonstrates their simultaneous influence, thereby offering a more comprehensive understanding of innovation ecosystem dynamics.

5.3. Theoretical Implications

This study makes several important theoretical contributions. First, it extends the literature on entrepreneurship and innovation by integrating Strategic Global Entrepreneurship into the context of higher education innovation ecosystems. While prior research has predominantly focused on firm-level analysis, this study demonstrates that global entrepreneurial strategies are equally relevant at the institutional level. Second, the study contributes to the literature on university–industry collaboration by empirically validating its direct impact on innovation ecosystem performance. The findings support the assumptions of the Triple Helix model, which emphasizes the role of interactions between universities and industry in driving innovation. Third, by combining both constructs in a unified framework, this study enriches the theoretical understanding of how internal strategic orientation and external collaboration jointly influence innovation outcomes. This integrated perspective provides a more holistic view of innovation ecosystems and addresses the fragmentation identified in prior research.

5.4. Practical Implications

The findings of this study offer several practical implications for stakeholders in higher education and innovation ecosystems:

- For university leaders, the results highlight the importance of strengthening global entrepreneurial strategies. Institutions should actively promote international collaboration, participate in global innovation networks, and support cross-border entrepreneurial initiatives to enhance their innovation capabilities.

- For policymakers, the significant role of University–Industry Partnerships suggests the need to develop policies that encourage collaboration between academia and industry. This may include providing funding for joint research projects, facilitating industry involvement in education, and creating platforms for knowledge exchange.
- For industry practitioners, the findings emphasize the value of engaging with higher education institutions as strategic partners in innovation. Collaboration with universities can provide access to cutting-edge research, skilled human resources, and new technological opportunities.

5.5. Contextual Implications in Indonesia

This study provides important insights into the development of innovation ecosystems in Indonesia. As an emerging economy, Indonesia faces challenges related to limited collaboration, low commercialization of research, and weak integration into global innovation networks. The findings suggest that strengthening both global entrepreneurial orientation and university–industry partnerships can significantly improve innovation ecosystem performance. In particular, the stronger effect of partnerships indicates that immediate improvements can be achieved by enhancing collaboration mechanisms between universities and industry. Moreover, the study highlights the need for higher education institutions in Indonesia to move beyond traditional roles and adopt more entrepreneurial and globally oriented strategies. This transformation is essential for improving competitiveness and contributing to national innovation goals.

6. MANAGERIAL IMPLICATIONS

The findings provide several managerial implications for higher education institutions, policymakers, and industry stakeholders in strengthening innovation ecosystems. University leaders should enhance Strategic Global Entrepreneurship by promoting international collaborations, participating in global innovation networks, and supporting cross-border entrepreneurial initiatives to improve institutional innovation capabilities. Furthermore, the stronger influence of University–Industry Partnerships indicates that universities should prioritize strategic collaboration mechanisms, including joint research projects, knowledge exchange, resource sharing, and technology commercialization with industry partners. Policymakers can support these efforts by developing frameworks that encourage university–industry collaboration and global innovation engagement. From a digital service management perspective, institutions may further leverage digital platforms and collaborative technologies to facilitate knowledge sharing, coordinate innovation activities, and strengthen connections among ecosystem actors. These strategic initiatives can help higher education institutions transform into entrepreneurial organizations that contribute more effectively to sustainable innovation development.

7. CONCLUSION

This study examined the impact of Strategic Global Entrepreneurship and University–Industry Partnerships on Innovation Ecosystem Performance within Indonesian higher education institutions. Using a quantitative approach and PLS-SEM analysis, the findings demonstrate that both Strategic Global Entrepreneurship and University–Industry Partnerships have positive and significant effects on innovation ecosystem performance. Strategic Global Entrepreneurship enhances innovation outcomes by enabling universities to access global knowledge networks, explore international opportunities, and develop outward-oriented strategies, while University–Industry Partnerships provide a stronger and more direct contribution through knowledge transfer, resource integration, and research commercialization.

This study contributes to the literature by integrating Strategic Global Entrepreneurship and University–Industry Partnerships into a unified empirical model, addressing the fragmentation of previous studies that examined these factors separately. By focusing on Indonesia as an emerging economy, this research provides context-specific evidence regarding innovation ecosystem development. From a practical perspective, higher education institutions should strengthen both global engagement and collaborative strategies, while policymakers and industry stakeholders should support initiatives that encourage internationalization, university–industry collaboration, and innovation-driven partnerships.

Despite its contributions, this study has several limitations. The cross-sectional design limits the ability to capture changes in innovation ecosystems over time, suggesting the need for future longitudinal research. Additionally, this study examines only direct relationships and does not include mediating or moderating variables, such as knowledge transfer, innovation capability, or government support. Future studies may extend

this framework by incorporating these factors and conducting comparative research across different countries to further validate the findings.

8. DECLARATIONS

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8.2. Author Contributions

Conceptualization: CL; Methodology: AK; Software: EA; Validation: AK and CL; Formal Analysis: EA and AK; Investigation: CL; Resources: EA; Data Curation: AK; Writing Original Draft Preparation: EA and CL; Writing Review and Editing: AK and EA; Visualization: CL; All authors, CL, AK, and EA, have read and agreed to the published version of the manuscript.

8.3. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

8.4. Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

8.5. Declaration of Conflicting Interest

The authors declare that they have no conflicts of interest, known competing financial interests, or personal relationships that could have influenced the work reported in this paper.

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