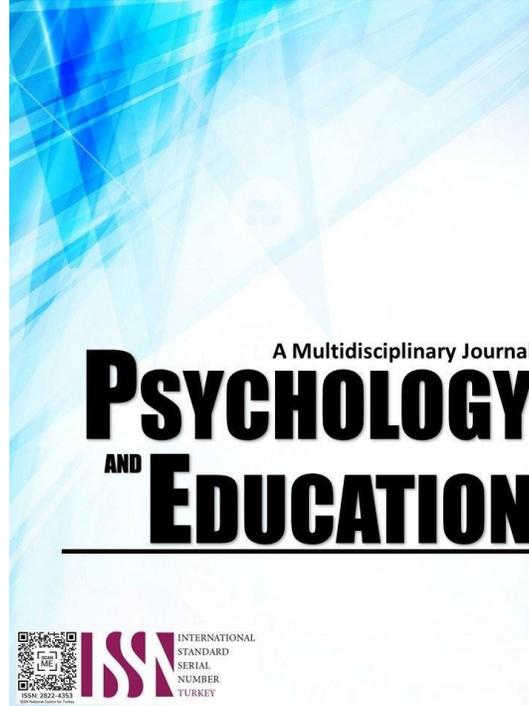


INNOVATION ECOSYSTEM DYNAMICS AND COMPETITIVENESS AMONG PRIVATE COLLEGES AND UNIVERSITIES



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Innovation Ecosystem Dynamics and Competitiveness Among Private Colleges and Universities

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Abstract

This study examines the relationship between innovation ecosystem dynamics and institutional competitiveness among private colleges and universities in Jiangxi Province, China. Using a quantitative descriptive-correlational design, the study surveyed 500 stakeholders across 29 private higher education institutions using a researcher-developed instrument measuring innovation ecosystem dynamics, R&D investment, stakeholder involvement, and competitiveness. Descriptive analysis showed that while stakeholder involvement was consistently high, overall innovation ecosystem performance, particularly R&D capacity, remained moderate. Competitiveness rankings revealed that smaller institutions outperformed larger ones across instruction quality, research productivity, and social service contribution. Contrary to theoretical expectations, Spearman correlation results indicated no significant positive relationship between innovation ecosystem components and competitiveness; instead, several significant negative correlations emerged, most notably between R&D capacity and competitiveness indicators. These findings suggest a structural misalignment in which resource-limited institutions invest in ecosystem activities that do not translate into competitive advantage and may even divert critical resources away from core instructional and community functions. The study highlights the need for a refined competitiveness framework that emphasizes strategic internal alignment, selective ecosystem engagement, and context-specific innovation policies tailored to the realities of private institutions in resource-constrained environments.

Keywords: *innovation ecosystem, institutional competitiveness, private higher education, R&D capacity, stakeholder involvement, Jiangxi Province*

Introduction

Higher education institutions (HEIs) play a vital role in advancing knowledge creation, fostering innovation, and contributing to socioeconomic development, particularly in emerging economies where education is closely tied to regional growth trajectories (Kearney, 2009). In this context, private colleges and universities are increasingly positioned as key actors within innovation ecosystems, requiring them to build collaborative networks with government agencies, industries, and communities to enhance their competitiveness and relevance (Heaton et al., 2019; Reichert, 2019; Shaeffer et al., 2018). Such ecosystems emphasize the value of shared resources, co-created knowledge, and synergistic partnerships, which theoretically strengthen institutional performance across instruction, research, and community engagement. However, despite widespread global adoption of innovation ecosystem frameworks, their applicability in resource-constrained contexts remains underexplored.

Existing scholarship predominantly examines well-resourced public universities, where strong R&D infrastructures and robust networks facilitate effective ecosystem functioning. Studies highlight that innovation ecosystems contribute positively to competitiveness when institutions possess the internal capacity to translate collaborative activities into knowledge-intensive outputs (Bayramova, 2024; Angrisani et al., 2023). However, limited evidence exists on whether these same dynamics operate effectively within private institutions, especially in developing regions, where financial constraints, weak research infrastructure, and inconsistent policy support often impede ecosystem development. This creates a substantial knowledge gap, particularly in provinces such as Jiangxi, China, where private higher education institutions face structural disadvantages and are underrepresented in national and global competitiveness rankings (Yin & Huang, 2023; Jiang, 2017).

The disconnect between theoretical expectations and contextual realities raises critical questions regarding the relationship between innovation ecosystem dynamics and institutional competitiveness in private universities. Furthermore, the assumption that enhancing policy support, university-industry linkages, and R&D capacity will automatically boost competitive positioning has not been empirically validated in these environments. Preliminary reports suggest that resource diversion, mission drift, and misaligned strategies may diminish rather than strengthen competitiveness, but systematic evidence remains scarce. Thus, there is an urgent need to investigate whether innovation ecosystem components genuinely drive competitive advantage or impose additional burdens on institutions already operating under severe resource constraints.

In response to this gap, the present study examines the innovation ecosystem dynamics of private colleges and universities in Jiangxi Province and analyzes their relationship with institutional competitiveness. Specifically, it assesses ecosystem dimensions, policy support, university-industry collaboration, R&D capacity, and industrial cooperation alongside competitiveness indicators such as instruction quality, research output, and social service contribution. Employing a descriptive-correlational approach involving 500 stakeholders across 29 institutions, the study seeks to determine whether ecosystem dynamics align with competitive performance or whether structural and contextual limitations inhibit their expected impact.

This study contributes to higher education scholarship in three significant ways. First, it provides empirical evidence from a resource-

limited private sector, thereby addressing a substantial gap in innovation ecosystem research. Second, it challenges prevailing theoretical assumptions by uncovering patterns such as negative correlations between R&D capacity and competitiveness that contradict established models based on well-funded universities. Third, it offers practical insights for institutional leaders and policymakers, advocating for strategic integration rather than expansion of ecosystem components to ensure that innovation activities reinforce rather than undermine core academic functions. In doing so, the study proposes a refined conceptualization of competitiveness tailored to the realities of private higher education institutions in developing regions.

Research Objectives

The primary objective of this study was to empirically investigate the relationship between innovation ecosystem dynamics and institutional competitiveness in private colleges and universities in Jiangxi Province, China. To achieve this overarching aim, the study pursued the following specific objectives:

1. To profile the participating institutions and their key stakeholders in terms of relevant demographic and institutional characteristics.
2. To assess the perceived levels of:
 - 1.1. Innovation ecosystem dynamics, encompassing policy support, university-industry collaboration, R&D capacity, and industrial collaboration;
 - 1.2. Institutional competitiveness, measured through instruction quality, research output, and social service contributions;
 - 1.3. To examine whether significant differences exist in the perceptions of innovation ecosystem dynamics and institutional competitiveness based on the demographic profiles of stakeholders and the institutional profiles (e.g., type and size); and
 - 1.4. To determine the existence and strength of the relationship between the dimensions of the innovation ecosystem dynamics and the dimensions of institutional competitiveness.

Methodology

Research Design

This study employed a quantitative descriptive–correlational research design to examine the relationship between innovation ecosystem dynamics and institutional competitiveness among private colleges and universities in Jiangxi Province, China. The descriptive component was used to determine the levels of innovation ecosystem dynamics, R&D investment, stakeholder involvement, and competitiveness, while the correlational component examined the associations among these variables. Given the non-manipulative nature of institutional conditions and the need to understand naturally occurring patterns, a cross-sectional quantitative approach was deemed appropriate for capturing stakeholder perceptions and institutional differences within the study’s timeframe and geographic scope.

Respondents

The target population consisted of stakeholders from private higher education institutions, including administrators, faculty members, students, and external partners such as industry collaborators and government representatives. A total enumeration approach was initially adopted to include all private colleges and universities in Jiangxi Province. Out of 32 institutions invited, 29 agreed to participate. From each institution, approximately 15 qualified respondents were selected through stratified sampling, ensuring proportional representation across stakeholder groups. This resulted in 500 valid responses, exceeding the required sample size and enhancing the representativeness and statistical power of the findings. Participating institutions varied in type (colleges, technology institutes, and one comprehensive university) and size (large, medium, and emerging).

Instrument

Data were collected using a researcher-developed structured questionnaire grounded in an extensive review of literature on innovation ecosystems and institutional competitiveness. The instrument comprised five major sections, beginning with the respondents’ demographic profile and institutional characteristics. It also assessed innovation ecosystem dynamics, including policy support, university–industry collaboration, R&D capacity, and industrial cooperation, using a 5-point Likert scale. A separate section evaluated R&D investment using both quantitative indicators and perception-based items, while stakeholder involvement was measured according to engagement frequency, participation, and perceived influence. Finally, institutional competitiveness was operationalized across three core dimensions: instruction quality, research output, and social service contributions. Reliability testing using Cronbach’s alpha confirmed strong internal consistency across all multi-item scales, ensuring the instrument’s suitability for robust quantitative analysis.

Procedure

Formal letters of communication were sent to institutional administrators requesting approval to conduct the study. Upon approval and ethical clearance, data collection was conducted through both online surveys (Google Forms) and paper-based questionnaires to ensure inclusivity across institutions with varying levels of digital access. Participants received an electronic informed consent form outlining

the study's purpose, voluntary nature, confidentiality, and data-handling procedures. Data collection was completed within a defined timeline, and follow-up reminders were issued to maximize response rates. Completed surveys were screened for completeness before inclusion in the final dataset.

Ethical Considerations

The study adhered to standard ethical protocols for research involving human participants. Ethical clearance for data collection was obtained from the Central Philippine University Research Ethics Board. All participants were informed about the nature and objectives of the study, the confidentiality of their responses, and their right to withdraw at any stage without penalty. No personal identifiers were collected to ensure anonymity. Data were stored securely and used solely for academic purposes. Only aggregated results were reported to prevent the identification of institutions or individuals.

Results

Table 1. *Profile of Participating Institutions (N = 29)*

<i>Institution Profile</i>	<i>Category</i>	<i>Frequency (n)</i>	<i>Percentage (%)</i>
Type of Institution	College	19	66%
	Technology Institute	9	31%
	University	1	3%
Institution Size	Large	15	52%
	Medium-sized	10	34%
	Emerging	4	14%

Table 1 presents the institutional profile of the 29 participating private higher education institutions. The majority were classified as colleges (66%), followed by Technology Institutes (31%), with only one University (3%). In terms of size, most institutions were Large (52%), while Medium-sized (34%) and Emerging (14%) institutions constituted the remainder.

Table 2. *Descriptive Statistics for Innovation Ecosystem Dynamics (N = 29 Institutions)*

<i>Dimension</i>	<i>Mean (M)</i>	<i>Interpretation</i>
Policy Support	2.98	Moderate
University–Industry Collaboration	3.21	Moderate to High
Industrial Collaboration	3.09	Moderate
R&D Capacity	2.99	Moderate (Weakest)

Table 2 shows the mean scores of the four dimensions of innovation ecosystem dynamics. University–Industry Collaboration received the highest rating ($M = 3.21$), while R&D Capacity emerged as the weakest area ($M = 2.99$). All dimensions fell within the moderate level, indicating room for improvement across institutions.

Table 3. *R&D Investment and Stakeholder Involvement*

<i>Variable</i>	<i>Mean (M)</i>	<i>Interpretation</i>
R&D Investment (in million RMB)*	2.84	Low to Moderate
Stakeholder Involvement	3.71	High

Table 3 summarizes the levels of R&D investment and stakeholder involvement. R&D investment was generally low to moderate ($M = 2.84$ million RMB), revealing significant disparities across institution types. Stakeholder involvement registered a consistently high rating ($M = 3.71$), highlighting strong engagement across all institutions.

Table 4. *Summary of Competitiveness Ranking Patterns Across Institution Sizes*

<i>Institution Size</i>	<i>Competitiveness Pattern</i>	<i>Key Observations</i>
Large Institutions	Lower competitiveness	Stronger research output but weaker teaching and social service performance
Medium-sized Institutions	Higher competitiveness	Balanced performance across all domains
Emerging/Small Institutions	Highest competitiveness	Agile, strong instruction quality, and social service contribution

Table 4 provides an overview of how competitiveness varied across institution sizes. Smaller and medium-sized institutions ranked higher in overall competitiveness because of balanced performance across the instruction, research, and social service domains. Larger institutions, despite stronger research output, lagged in instruction and community-related indicators.

Table 5. *Kruskal–Wallis Test for Differences Across Institution Profiles*

<i>Variable</i>	<i>Grouping Variable</i>	<i>H Statistic</i>	<i>p-value</i>	<i>Interpretation</i>
Innovation Ecosystem Dynamics	Institution Type		> .05	Not Significant
Competitiveness	Institution Type		> .05	Not Significant
R&D Capacity	Institution Size	6.42	.040	Significant difference; large institutions are higher
Competitiveness Dimensions	Institution Size		.000	Smaller institutions higher

Table 5 reports the results of the Kruskal–Wallis tests. No significant differences were found in innovation ecosystem dynamics or competitiveness across institution types. However, R&D Capacity differed significantly by institution size ($H = 6.42$, $p = .040$). Competitiveness dimensions also showed significant differences, with smaller institutions consistently outperforming larger ones.

Table 6. Spearman Rank Correlations Between Innovation Ecosystem Variables and Competitiveness

Pair of Variables	Spearman's r	p-value	Interpretation
R&D Capacity × Instruction Quality	-.594	.001	Significant negative correlation
R&D Capacity × Research Output	Negative	< .05	Significant negative correlation
R&D Capacity × Social Service	Negative	< .05	Significant negative correlation
University–Industry Collaboration × Competitiveness	Negative	< .05	Significant negative correlation
Industrial Collaboration × Competitiveness	Negative	< .05	Significant negative correlation

Table 6 presents the Spearman rank correlations between innovation ecosystem components and competitiveness indicators. The correlations revealed counterintuitive negative relationships, particularly between R&D Capacity and all dimensions of competitiveness. University–Industry Collaboration and Industrial Collaboration also showed significant negative associations, suggesting potential misalignment between ecosystem activities and institutional performance.

Discussion

The findings of this study reveal a complex and paradoxical relationship between innovation ecosystem dynamics and institutional competitiveness among private higher education institutions in Jiangxi Province. While innovation ecosystems are widely theorized to strengthen institutional performance, particularly through enhanced policy support, university–industry collaboration, and R&D capacity, the results demonstrate that these dynamics do not translate into competitive advantage within the context of resource-constrained private institutions. Instead, several innovation ecosystem components, most notably R&D capacity and industrial collaboration, were found to have significant negative correlations with competitiveness indicators (Wang et al., 2024; He et al., 2022). This contradicts conventional assumptions derived from studies of well-resourced public universities, where robust ecosystem engagement typically supports research productivity, instructional quality, and community service.

The consistently moderate ratings across innovation ecosystem dimensions reflect a structural imbalance in which stakeholder involvement is strong yet internal R&D capacity remains critically weak. Despite stakeholders being highly engaged, a notable strength across institutions, this engagement does not appear to enhance institutional performance. A possible explanation lies in what may be termed an ecosystem misalignment effect, where collaborative activities exist but do not meaningfully strengthen the institution's core academic functions. The weak R&D infrastructure and limited financial investment further exacerbate this issue, suggesting that external engagement alone is insufficient without internal absorptive capacity to transform partnerships into innovation outputs.

An unexpected yet important finding is that smaller institutions outperform larger ones in overall competitiveness. Medium-sized and emerging institutions consistently achieve higher rankings across instruction, research, and social service compared to their larger counterparts. Although larger institutions report higher R&D investment and stronger research output, these advantages do not translate into a stronger composite competitive standing. This suggests that scale may introduce managerial complexity, bureaucratic inertia, or diluted institutional focus, ultimately undermining performance in teaching and community programs. Conversely, smaller institutions may benefit from greater agility, closer stakeholder relationships, and clearer prioritization of core functions, which translate into stronger competitive performance.

The negative correlations between R&D capacity and competitiveness challenge a fundamental assumption in innovation ecosystem theory: that strengthening research capability inherently enhances institutional performance. In reality, the data imply that in financially constrained environments, increased focus on R&D may divert limited resources away from instruction quality and community service areas that form the traditional foundation of competitiveness for private institutions. This aligns with the concept of mission drift, where institutions overextend into research activities without the necessary infrastructure or funding, thereby compromising their primary strengths.

Moreover, the absence of significant differences in innovation ecosystem dynamics across institution types suggests a uniformly constrained environment, where structural challenges such as limited funding, weak research culture, and inadequate policy support affect Colleges, Technology Institutes, and Universities alike. The only meaningful differentiation emerged in institution size, reinforcing the argument that resource allocation and organizational structure, rather than institution type, are central to understanding competitive performance.

Conclusions

This study reveals that innovation ecosystem dynamics do not automatically translate into greater competitiveness among private higher education institutions in Jiangxi Province. Despite strong stakeholder involvement and moderate collaboration, weak internal R&D capacity and limited research investment hinder institutions from converting ecosystem activities into a competitive advantage. Counterintuitively, higher R&D capacity and industrial collaboration were associated with lower competitiveness, suggesting resource

misalignment and potential mission drift in resource-constrained environments. Smaller institutions demonstrated greater overall competitiveness, suggesting that agility and focused priorities can confer strategic advantages. These findings underscore the need for context-specific innovation strategies that strengthen internal capacity and align ecosystem activities with core institutional functions.

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