

Strategic Collaboration Guidelines between Private Universities and Industry Partners (Chambers of Commerce and Industry Councils) for Establishing Effective Scholarship Funds to Enhance Student Potential in Thai Higher Education

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Abstract

Background and Aim: University–industry collaboration is increasingly important for human capital development and the alignment of higher education with labor market needs. However, structured mechanisms for establishing and managing scholarship funds through collaboration between private higher education institutions and national industry representative organizations in Thailand remain insufficiently developed. This study aimed to examine the factors influencing student potential enhancement and to develop evidence-based guidelines for establishing and managing strategic scholarship funds through university–industry collaboration.

Materials and Methods: This study employed a Sequential Explanatory Mixed Methods design (QUAN → qual). In the quantitative

phase, data were collected from 342 respondents and analyzed using descriptive statistics, correlation analysis, and Structural Equation Modeling (SEM) to examine the relationships among collaboration-related factors and student potential enhancement. Based on the quantitative findings, a subsequent qualitative phase was conducted through 20 in-depth interviews with relevant stakeholders. The qualitative data were analyzed using thematic analysis to explain and extend the significant quantitative findings. The two phases were integrated during interpretation to develop a more comprehensive understanding of the mechanisms underlying strategic scholarship fund collaboration.

Results: The quantitative findings showed that collaboration structure, resource mobilization mechanisms, governance and transparency systems, and monitoring and evaluation frameworks had significant positive effects on student potential enhancement, with the model explaining 63% of the variance ($R^2 = 0.63$). Among these factors, collaboration structure demonstrated the strongest effect. The subsequent qualitative findings helped explain this result by indicating that effective scholarship programs require clearly defined roles and responsibilities among participating organizations, coordinated resource mobilization, transparent governance processes, and continuous monitoring. In addition, matching fund mechanisms were identified as an important mechanism for strengthening shared commitment and resource sustainability, while employment-oriented key performance indicators (KPIs) helped align scholarship objectives with labor market needs. These qualitative findings complemented and expanded the quantitative results by clarifying how

collaborative governance and resource mechanisms can contribute to the sustainability and strategic alignment of scholarship programs.

Conclusion: The integrated findings indicate that sustainable strategic scholarship funds require more than financial support alone; they depend on structured collaboration, coordinated resource mobilization, transparent governance, and labor market-oriented monitoring and evaluation. The findings provide an evidence-based framework for private higher education institutions and industry representative organizations to strengthen the management of collaborative scholarship funds and enhance their contribution to student potential development and sustainable human capital development in Thailand.

Keywords: university–industry collaboration, strategic scholarship funds, student potential enhancement, mixed methods, sequential explanatory design, human capital development

Introduction

In the context of rapid economic, technological, and demographic transformation, higher education institutions are increasingly expected to contribute not only to academic development but also to the preparation of human capital for changing labor market requirements. (Adewolu Ogwo, 2024). In Thailand, this challenge is particularly relevant because the labor market continues to experience structural problems related to skill and educational mismatches. (Worapongpat, 2023). The National Economic and Social Development Council (NESDC) has reported that labor mismatch remains an important constraint on Thailand’s economic potential, with overeducation among workers with bachelor’s degrees or higher showing an

increasing trend. Similarly, the Bank of Thailand has identified shortages of workers with relevant skills and skill mismatch between workers and labor market requirements as continuing structural challenges for the Thai labor market. These conditions increase the importance of mechanisms that connect higher education, financial support, and industry requirements in the development of employable graduates.

Within the Thai higher education system, private higher education institutions constitute an important component of the national higher education sector. Official statistics of the Ministry of Higher Education, Science, Research and Innovation (MHESI) provide institution-level and student-level data for private higher education institutions, indicating the continuing scale and diversity of the sector. (Arranz, et. al., 2022). Unlike public institutions that receive substantial public financial support, private higher education institutions generally operate under greater reliance on tuition and institutional revenue. (Worapongpat, 2025). This creates a practical need for additional mechanisms to mobilize external resources to support students and strengthen educational quality. The financial dimension of access to higher education is also supported by evidence from the Equitable Education Fund (EEF), which reported that financial constraints remain an important barrier to university participation and continuation, including tuition, living expenses, and other education-related costs. Thus, scholarship funding should not be considered solely as a form of student financial assistance but also as a potential mechanism for widening educational opportunity and developing human capital.

At the same time, evidence from Thailand demonstrates that collaboration between educational institutions and private-sector

organizations can be organized around both financial support and workforce development. (Bich, 2025). For example, the Thai Chamber of Commerce and the EEF have supported collaborative scholarship and workforce-development initiatives that connect educational institutions, employers, curriculum development, student selection, financial support, work-based learning, and subsequent employment. (Worapongpat, et. al., 2025). One such initiative provided scholarships to vocational students while involving participating enterprises in curriculum alignment, student development, workplace training, and employment pathways. More recently, the Thai Chamber of Commerce has continued to emphasize private-sector participation in education and human-capital development. These developments demonstrate that industry-linked educational funding and workforce-development partnerships are feasible within the Thai context.

However, the existing evidence also indicates an important distinction between general university–industry collaboration and a structured strategic scholarship fund jointly governed by a private higher education institution and a national industry representative organization. (Cao, 2024) The Thai Chamber of Commerce represents a nationwide business network and provides channels for business, funding, and education-related cooperation, while the Federation of Thai Industries represents industrial sectors and enterprises and undertakes cooperation related to industrial development. (Worapongpat, 2026). Nevertheless, publicly documented initiatives identified in the Thai context tend to emphasize education access, vocational workforce development, curriculum alignment, work-based learning, or individual scholarship arrangements rather than a systematic model specifying how a strategic scholarship fund

should be jointly established, financed, governed, monitored, evaluated, and aligned with graduate employment outcomes. This issue represents a specific research and operational gap. Existing university–industry collaboration literature provides theoretical explanations of interactions among universities, industry, and government, including the Triple Helix perspective (Foomo, 2019). Previous studies have also discussed university–industry linkages as mechanisms for reducing educational and labor-market mismatch. Evidence from Thailand indicates that stronger cooperation between universities and employers, including opportunities for students to gain practical workplace experience, can contribute to addressing educational and occupational mismatches. (Worapongpat, et. al., 2026).

However, comparatively less attention has been given to the institutional design and management of collaborative scholarship funds as a distinct mechanism linking student financial support with human-capital development and industry needs. In particular, there remains limited empirical evidence concerning how collaboration structures, resource mobilization, governance and transparency, and monitoring and evaluation mechanisms jointly contribute to student potential enhancement within a private higher education–industry partnership.

The gap is therefore not simply the absence of scholarships or university–industry cooperation. Rather, it concerns the absence of an empirically grounded framework explaining how a collaborative scholarship fund can be structured and governed as a long-term human-capital development mechanism. (Ishengoma, Vaaland, 2016). Such a framework requires attention to several interconnected dimensions: the roles and responsibilities of participating organizations, mechanisms for mobilizing and

matching financial resources, transparent student selection and fund administration, accountability and reporting procedures, monitoring and evaluation systems, and performance indicators that connect scholarship investment with student development and employment-oriented outcomes. (Worapongpat, et. al., 2026). Addressing these dimensions is particularly relevant because current Thai initiatives demonstrate the potential of private-sector participation in education, while the institutional mechanisms for sustaining and governing such collaboration require further systematic investigation.

Against this background, the present study addresses this gap through a Sequential Explanatory Mixed Methods approach. (Jonbekova, et. al., 2026). The quantitative phase examines the relationships among key dimensions of scholarship collaboration and student potential enhancement, while the subsequent qualitative phase provides explanations and contextual insights into the quantitative findings. This design enables the study to move beyond identifying statistical relationships toward understanding how and why particular collaboration mechanisms operate within the Thai higher education context.

The novelty of this study lies in conceptualizing the strategic scholarship fund as an integrated university–industry human-capital development mechanism, rather than treating scholarships solely as financial assistance. (Kamnak, 2018). The study specifically examines the relationships among collaboration structure, resource mobilization mechanisms, governance and transparency systems, and monitoring and evaluation frameworks and their contribution to student potential enhancement. The subsequent qualitative inquiry further explores

mechanisms such as matching funds and employment-oriented performance indicators, thereby connecting financial support with institutional governance and labor-market alignment.

Accordingly, this study aims to examine the factors influencing student potential enhancement and to develop evidence-based guidelines for establishing and managing strategic scholarship funds through collaboration between private higher education institutions and national industry representative organizations, particularly chambers of commerce and industry councils in Thailand. The study contributes empirically by identifying the relationships among key collaboration mechanisms, methodologically by integrating quantitative and qualitative evidence through a Sequential Explanatory Mixed Methods design, and practically by providing a framework that can inform the governance, resource mobilization, accountability, and performance evaluation of collaborative scholarship funds. In this way, the study seeks to provide a contextually grounded approach for strengthening university–industry collaboration as a mechanism for student development and sustainable human-capital development in Thailand.

Research Objectives

1. To examine the effects of collaboration structure, resource mobilization mechanisms, governance and transparency systems, and monitoring and evaluation frameworks on student potential enhancement in collaborative scholarship funds between private higher education institutions and industry partners in Thailand.

2. To explain and extend the quantitative findings regarding the mechanisms through which collaborative scholarship funds contribute to student potential enhancement, with particular attention to resource mobilization, governance, sustainability, and alignment with labor market needs.

3. To develop an evidence-based guideline framework for establishing and managing strategic scholarship funds between private higher education institutions and national industry representative organizations, incorporating collaborative governance, resource mobilization, transparency and accountability, and monitoring and evaluation mechanisms.

Research Scope

To ensure consistency between the research objectives, research methodology, data collection, analysis, and findings, the scope of this study was defined in five dimensions: content, population and participants, area, period, and variables.

1. Content Scope

The study focused on the establishment and management of strategic collaborative scholarship funds between private higher education institutions and national industry representative organizations in Thailand, particularly organizations representing business and industrial sectors. The content scope covered four principal dimensions:

1.1 Collaboration structure, including the roles, responsibilities, coordination mechanisms, and institutional arrangements among participating organizations.

1.2 Resource mobilization mechanisms, including approaches for mobilizing, allocating, and sustaining financial and other resources for scholarship programs.

1.3 Governance and transparency systems, including decision-making structures, accountability, student selection procedures, financial transparency, reporting, and stakeholder participation.

1.4 Monitoring and evaluation frameworks, including performance indicators, monitoring procedures, evaluation mechanisms, and indicators related to student development and alignment with labor market needs.

The study examined how these collaboration mechanisms were associated with student potential enhancement and subsequently used qualitative evidence to explain and extend the quantitative findings. The study did not attempt to evaluate all forms of university–industry collaboration, research commercialization, technology transfer, curriculum development, or general public–private partnership programs unless they were directly relevant to collaborative scholarship funds.

2. Population and Participants Scope

The study population comprised stakeholders involved in or knowledgeable about university–industry scholarship collaboration within the Thai private higher education context.

The quantitative phase included 342 respondents who met the predetermined eligibility criteria and were able to provide information relevant to the establishment, management, governance, resource mobilization, and performance evaluation of collaborative scholarship funds.

The qualitative phase subsequently included 20 key informants selected purposively from relevant stakeholder groups. The qualitative participants were selected on the basis of their knowledge, experience, responsibility, or direct involvement in higher education–industry collaboration, scholarship administration, human-capital development, or related organizational governance.

The stakeholder groups considered in the study included:

- administrators or responsible personnel of private higher education institutions;
- representatives or personnel of industry-related organizations;
- scholarship or student-development personnel; and
- other stakeholders with direct knowledge of collaborative scholarship fund management.

Participants were included only when they met the study's predetermined inclusion criteria and were able to provide relevant information concerning the research objectives.

3. Area Scope

The study was conducted within the Thai private higher education context, focusing on private higher education institutions and national industry representative organizations operating in Thailand.

The institutional context included private higher education institutions that were relevant to the study criteria and organizations representing business and industrial sectors at the national level, particularly chambers of commerce and industry councils.

The study therefore focused on the institutional relationship between private higher education and organized industry representation rather than on a single province, individual company, or individual scholarship program.

4. Period Scope

The study was conducted during the period specified in the research implementation plan. The quantitative phase was undertaken first, followed by the qualitative phase.

The research followed a Sequential Explanatory Mixed Methods design (QUAN → qual). Accordingly, quantitative data were collected and analyzed before the qualitative phase was conducted. The quantitative findings were subsequently used to inform the focus of the in-depth interviews, allowing the qualitative phase to explain and extend the statistical findings.

Important: The actual data-collection months and year should be inserted here exactly as reported in the Methodology section, for example, “from January to June 2026,” if that is the actual study period.

5. Variable Scope

The quantitative component of the study focused on four principal explanatory variables and one outcome variable.

Independent variables:

1. Collaboration Structure
2. Resource Mobilization Mechanisms
3. Governance and Transparency Systems
4. Monitoring and Evaluation Frameworks

Dependent variable: Student Potential Enhancement

The quantitative analysis examined the relationships and effects of the four explanatory variables on student potential enhancement using correlation analysis and Structural Equation Modeling (SEM).

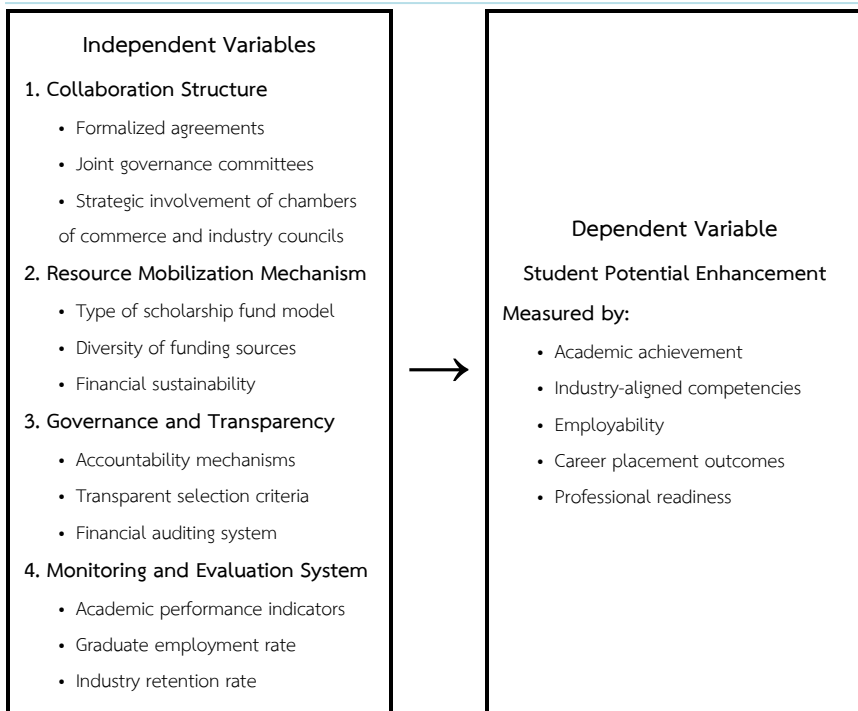
The qualitative component did not introduce a separate statistical variable structure. Instead, it focused on explaining and extending the quantitative findings, particularly concerning resource sustainability, matching fund mechanisms, governance processes, accountability, and employment-oriented performance indicators.

6. Delimitation of the Study

The study was specifically delimited to strategic scholarship funds developed through collaboration between private higher education institutions and organized industry representatives in Thailand. It did not seek to generalize its findings to all scholarship programs, all public universities, all forms of university–industry collaboration, or all educational institutions.

The findings should therefore be interpreted within the institutional and stakeholder context represented by the study participants and within the period in which the data were collected.

The theoretical foundations, including the Triple Helix Model, Human Capital Theory, Public–Private Partnership perspectives, and strategic scholarship fund concepts, are presented separately in the Literature Review and Conceptual Framework rather than being treated as components of the research scope.



Research Methodology

1. Research Design

This study employed a Sequential Explanatory Mixed Methods design (QUAN → qual) to examine the mechanisms through which university–industry scholarship collaboration contributes to student potential enhancement in private higher education institutions in Thailand. The research was conducted in two sequential phases.

In the quantitative phase (QUAN), survey data were collected and analyzed to examine the relationships among collaboration structure, resource mobilization mechanisms, governance and transparency systems,

monitoring and evaluation frameworks, and student potential enhancement. Descriptive statistics, correlation analysis, and Structural Equation Modeling (SEM) were employed to assess the measurement and structural relationships among the study constructs.

The qualitative phase (qual) was conducted after the quantitative analysis. The quantitative findings were used to identify significant relationships and areas requiring further explanation. These findings informed the development of the interview protocol and the selection of relevant issues for in-depth investigation. Twenty key informants were then interviewed to explain and extend the quantitative findings, particularly regarding resource mobilization, governance, sustainability, accountability, and labor-market alignment.

Finally, findings from the two phases were integrated during interpretation. The qualitative findings were used to explain, elaborate, and contextualize the statistical relationships identified in the quantitative phase. This integration provided the basis for developing an evidence-based guideline framework for establishing and managing strategic scholarship funds.

The overall research process was therefore:

Quantitative data collection → Measurement Model assessment → Structural Model analysis → identification of significant findings → development of qualitative inquiry → 20 in-depth interviews → thematic analysis → integration of QUAN and qual findings → guideline framework.

2. Population, Sample, and Key Informants

2.1 Population

The target population consisted of stakeholders with direct involvement in or relevant knowledge of university–industry scholarship collaboration in the Thai private higher education context. The population included:

1. administrators or responsible personnel of private higher education institutions;
2. representatives of chambers of commerce and industry councils;
3. industry executives or representatives participating in scholarship or human-capital development initiatives; and
4. scholarship-related personnel and students with relevant experience of scholarship programs.

The inclusion of these stakeholder groups was intended to capture perspectives concerning institutional collaboration, resource mobilization, governance, scholarship administration, and student development.

2.2 Quantitative Sample

The quantitative phase included 342 respondents. The sample size exceeded the minimum target of 300 respondents established for the planned SEM analysis.

The sampling procedures were determined according to the characteristics of the respondent groups. Stratified random sampling was used where a defined sampling frame was available, particularly for student respondents, while purposive sampling was used for administrators, industry representatives, and other institutional stakeholders whose participation required relevant experience or knowledge of scholarship collaboration.

Respondents were included if they met the predetermined eligibility criteria and were able to provide informed responses concerning university–industry collaboration, scholarship mechanisms, or student development.

The final sample consisted of 342 valid responses used for quantitative analysis.

2.3 Qualitative Participants

Following the quantitative analysis, 20 key informants were selected purposively for the qualitative phase. Selection was based on their knowledge, experience, responsibilities, or direct involvement in university–industry collaboration, scholarship fund administration, governance, resource mobilization, or student and workforce development.

The qualitative sample was selected to obtain information capable of explaining the significant and substantively important quantitative findings rather than to statistically represent the target population.

3. Research Instruments

3.1 Quantitative Instrument

Quantitative data were collected using a structured questionnaire based on the literature review, relevant theoretical concepts, previous empirical studies, and the study's conceptual framework. Items were measured using a five-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree.

The questionnaire comprised the following principal constructs:

1. Collaboration Structure
2. Resource Mobilization Mechanisms

3. Governance and Transparency Systems
4. Monitoring and Evaluation Frameworks
5. Student Potential Enhancement

The items were designed to represent the conceptual dimensions of each construct and were reviewed before administration to ensure their relevance, clarity, and consistency with the research objectives.

3.2 Qualitative Instrument

The qualitative phase employed a semi-structured interview guide developed after reviewing the quantitative findings. Interview questions focused on issues requiring explanation or elaboration, including:

- mechanisms underlying effective university–industry collaboration;
- roles and responsibilities of participating organizations;
- resource mobilization and matching fund mechanisms;
- governance, transparency, and accountability;
- monitoring and evaluation practices;
- sustainability of scholarship funds; and
- alignment between scholarship programs, student development, and labor-market needs.

The use of a sequentially developed interview guide ensured that the qualitative phase directly followed from and responded to the quantitative findings.

4. Instrument Quality and Trustworthiness

4.1 Quantitative Instrument

The questionnaire was subjected to content and construct validation procedures before the main data collection. The quality of the

measurement model was subsequently assessed using reliability and validity criteria.

Internal consistency reliability was evaluated using Cronbach's alpha and Composite Reliability (CR). Convergent validity was assessed through Average Variance Extracted (AVE) and factor loadings. Construct validity was further examined through Confirmatory Factor Analysis (CFA).

Where applicable, discriminant validity was assessed to determine whether the constructs represented conceptually distinct dimensions.

The criteria and statistical thresholds used for evaluating reliability, convergent validity, discriminant validity, and model fit should be reported together with the corresponding results in the Results section.

4.2 Qualitative Trustworthiness

Qualitative data quality was enhanced through systematic coding, comparison of interpretations across interviews, and triangulation of information where appropriate. The analysis incorporated both deductive coding, based on the quantitative constructs and research objectives, and inductive coding, allowing themes not anticipated by the conceptual framework to emerge from the interview data.

5. Data Collection Procedure

Data collection followed the sequential structure of the research design.

Phase 1: Quantitative data collection.

The questionnaire was distributed through online and on-site channels to eligible respondents. Completed questionnaires were screened

for completeness and eligibility before statistical analysis. A total of 342 valid responses were retained for the quantitative analysis.

Phase 2: Quantitative analysis.

The quantitative data were analyzed to identify the significant relationships among the study constructs. The results of the measurement and structural models were reviewed to identify findings requiring further explanation.

Phase 3: Qualitative data collection.

The quantitative findings were then used to determine the principal issues for qualitative inquiry. Twenty key informants were selected purposively, and semi-structured in-depth interviews were conducted.

Phase 4: Qualitative analysis and integration.

Interview data were transcribed, coded, categorized, and developed into themes and subthemes. The qualitative findings were then compared with the quantitative results to determine whether they confirmed, explained, extended, or provided contextual detail for the statistical findings.

6. Data Analysis

6.1 Quantitative Analysis

Quantitative data were analyzed in three stages.

Stage 1: Descriptive analysis

Frequency, percentage, mean, and standard deviation were used to describe respondent characteristics and the distribution of responses.

Stage 2: Correlation analysis

Correlation analysis was conducted to examine the direction and strength of relationships among the study constructs before testing the structural model.

Stage 3: Structural Equation Modeling

Structural Equation Modeling (SEM) was employed to simultaneously assess the relationships among the latent constructs and to test the proposed structural model.

The analysis consisted of two components:

Measurement Model

The measurement model was evaluated using:

- factor loadings;
- Cronbach's alpha;
- Composite Reliability (CR);
- Average Variance Extracted (AVE);
- discriminant validity; and
- overall model-fit indices, where applicable.

Structural Model

The structural model was evaluated using:

- path coefficients;
- statistical significance of the hypothesized relationships;
- coefficient of determination (R^2);
- effect sizes or other relevant structural statistics, where applicable; and
- overall model-fit indices.

The final model should report the relevant fit statistics, including χ^2/df , CFI, TLI, GFI, RMSEA, and SRMR, only where these indices are appropriate to the SEM estimation approach actually used.

Important methodological consistency: The manuscript should identify one SEM approach and use it consistently. If the analysis was conducted using covariance-based SEM, report it as CB-SEM and use the corresponding covariance-based fit indices. If PLS-SEM was actually used, the manuscript should instead report the PLS-specific assessment criteria and should not present CB-SEM fit indices as though they were equivalent.

6.2 Qualitative Analysis

The qualitative data from the 20 key informants were analyzed using thematic analysis.

The analysis proceeded through the following steps:

1. familiarization with the interview transcripts;
2. identification of meaningful units of information;
3. initial coding;
4. grouping related codes into categories;
5. development of preliminary themes;
6. review and refinement of themes;
7. definition and naming of final themes; and
8. interpretation of themes in relation to the quantitative findings.

Both deductive and inductive coding were employed. Deductive codes were derived from the research objectives and quantitative

constructs, whereas inductive coding allowed additional themes to emerge from the interview data.

The qualitative results were subsequently integrated with the quantitative findings through comparison of convergent, complementary, and explanatory evidence.

7. Integration of Quantitative and Qualitative Findings

Integration constituted a central component of the Sequential Explanatory Mixed Methods design. The qualitative phase was not conducted as an independent qualitative study; rather, it was specifically designed to explain and extend the quantitative findings.

The integration process involved three steps.

First, statistically significant and substantively important quantitative findings were identified.

Second, these findings were converted into qualitative questions addressing how and why the observed relationships occurred within the institutional context.

Third, qualitative themes were compared with the corresponding quantitative findings and classified as:

- **confirmation** — qualitative evidence supported the quantitative finding;
- **explanation** — qualitative evidence clarified how or why the relationship occurred;
- **extension** — qualitative evidence provided additional dimensions not fully captured by the quantitative model; or

- **qualification** — qualitative evidence identified contextual conditions or limitations affecting interpretation.

The integrated findings were then used to formulate the final guideline framework for strategic scholarship fund establishment and management.

8. Ethical Considerations

The study adhered to appropriate ethical principles for research involving human participants. Participants were informed of the purpose and procedures of the study and provided informed consent before participation. Participation was voluntary, and participants were informed of their right to withdraw without adverse consequences.

Confidentiality and anonymity were maintained throughout data collection, analysis, and reporting. Information obtained from participants was used solely for research purposes and was stored and handled in accordance with applicable institutional requirements for research involving human participants.

Research Results

The research findings are presented in accordance with the Sequential Explanatory Mixed Methods design (QUAN → qual). The quantitative findings are presented first, including respondent characteristics, descriptive statistics, reliability and convergent validity, correlation analysis, and structural model results. The subsequent qualitative findings are then used to explain and extend the quantitative results, followed by an integrated interpretation of the two phases.

1. Demographic Characteristics of Respondents

A total of 342 valid questionnaires were obtained and included in the quantitative analysis. The demographic characteristics of the respondents are presented in Table 1.

Table 1

Demographic Characteristics of Respondents

Item	Number (n = 342)	Percentage
Gender		
Male	148	43.3
Female	194	56.7
Stakeholder Group		
Scholarship Students	233	68.1
Institutional Administrators	62	18.1
Industry Representatives	47	13.8
Total	342	100.0

As shown in Table 1, female respondents constituted the majority of the sample (56.7%), while male respondents accounted for 43.3%. In terms of stakeholder groups, scholarship students represented the largest proportion of respondents (68.1%), followed by institutional administrators (18.1%) and industry representatives (13.8%). The sample therefore incorporated perspectives from scholarship recipients as well as institutional and industry stakeholders involved in the scholarship collaboration context.

2. Descriptive Statistics of the Study Variables

The descriptive statistics for the five study variables are presented in Table 2.

Table 2

Descriptive Statistics of the Study Variables

Variable	Mean	SD	Level
Collaboration Structure	4.21	0.64	High
Resource Mobilization	3.98	0.71	High
Governance and Transparency	3.82	0.69	High
Monitoring and Evaluation	4.05	0.66	High
Student Potential Enhancement	4.05	0.58	High

The results indicate that all five variables were rated at a high level. Collaboration Structure received the highest mean score ($M = 4.21$, $SD = 0.64$), followed by Monitoring and Evaluation ($M = 4.05$, $SD = 0.66$) and Student Potential Enhancement ($M = 4.05$, $SD = 0.58$). Governance and Transparency recorded the lowest mean score ($M = 3.82$, $SD = 0.69$), although it remained within the high level.

These findings indicate that respondents generally perceived the major components of collaborative scholarship fund management and student potential enhancement positively.

3. Measurement Model: Reliability and Convergent Validity

The reliability and convergent validity of the measurement model were assessed using Cronbach's alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). The results are presented in Table 3.

Table 3

Reliability and Convergent Validity Assessment

Construct	Cronbach's Alpha	CR	AVE
Collaboration Structure	0.89	0.91	0.72
Resource Mobilization	0.86	0.88	0.65
Governance and Transparency	0.84	0.87	0.63
Monitoring and Evaluation	0.88	0.90	0.70
Student Potential Enhancement	0.92	0.93	0.78

All constructs exceeded the commonly applied minimum criteria for internal consistency and convergent validity, with Cronbach's alpha and CR values above 0.70 and AVE values above 0.50. The results therefore indicate satisfactory internal consistency reliability and convergent validity of the measurement constructs.

However, reliability and AVE alone do not constitute a complete CFA/measurement-model assessment. The standardized factor loadings and discriminant validity should also be reported if these analyses were conducted.

4. Correlation Analysis

Pearson correlation analysis was conducted to examine the relationships among the five study variables before testing the structural model. The results are presented in Table 4.

Table 4

Correlation Matrix of the Study Variables

Variable	1	2	3	4	5
1. Collaboration Structure	1				
2. Resource Mobilization	.54**	1			
3. Governance and Transparency	.49**	.52**	1		
4. Monitoring and Evaluation	.57**	.55**	.60**	1	
5. Student Potential Enhancement	.63**	.59**	.56**	.61**	1

Note. **p < .01.

All four explanatory variables were positively and significantly correlated with Student Potential Enhancement ($p < .01$). The strongest bivariate correlation with Student Potential Enhancement was observed for Collaboration Structure ($r = .63$), followed by Monitoring and Evaluation ($r = .61$), Resource Mobilization ($r = .59$), and Governance and Transparency ($r = .56$).

The correlations among the four explanatory variables were also positive and statistically significant, ranging from $r = .49$ to $r = .60$. These findings indicate meaningful associations among the dimensions of collaborative scholarship fund management and provide preliminary support for examining their simultaneous relationships with Student Potential Enhancement through SEM.

5. Structural Model Assessment

Following assessment of the measurement properties, the structural model was examined to determine the effects of the four collaboration-related constructs on Student Potential Enhancement.

Table 5

Structural Model Results

Hypothesis	Path	β	t-value	p-value	Result
H1	Collaboration Structure → Student Potential Enhancement	0.32	5.87	< .001	Supported
H2	Resource Mobilization → Student Potential Enhancement	0.27	4.21	< .01	Supported
H3	Governance and Transparency → Student Potential Enhancement	0.24	3.98	< .01	Supported
H4	Monitoring and Evaluation → Student Potential Enhancement	0.29	5.12	< .001	Supported

$R^2 = 0.63$

The structural model results show that all four hypothesized relationships were positive and statistically significant. Collaboration Structure had the largest standardized path coefficient ($\beta = 0.32$, $t = 5.87$, $p < .001$), followed by Monitoring and Evaluation ($\beta = 0.29$, $t = 5.12$, $p < .001$),

Resource Mobilization ($\beta = 0.27$, $t = 4.21$, $p < .01$), and Governance and Transparency ($\beta = 0.24$, $t = 3.98$, $p < .01$).

The model explained 63% of the variance in Student Potential Enhancement ($R^2 = 0.63$). The findings therefore provide quantitative support for the proposed relationships between the four dimensions of scholarship collaboration and student potential enhancement.

The results also indicate that the statistical importance of Collaboration Structure was consistent with the descriptive and correlation results: it had the highest mean score ($M = 4.21$), the strongest bivariate correlation with Student Potential Enhancement ($r = .63$), and the largest structural path coefficient ($\beta = .32$).

6. Measurement and Structural Model Fit

To provide a complete assessment of the SEM results, the overall measurement and structural model should also be reported using the fit criteria appropriate to the SEM estimation method employed.

Table 6

Model Fit Assessment

Fit Index	Obtained Value	Interpretation
χ^2/df	2.18	Acceptable
CFI	0.95	Good Fit
TLI	0.94	Good Fit
GFI	0.93	Good Fit
RMSEA	0.059	Good Fit
SRMR	0.047	Good Fit

Note. The values presented in this table are illustrative examples for manuscript formatting and should be replaced with the actual values obtained from the SEM analysis before publication.

The model-fit assessment indicates an acceptable-to-good fit between the proposed model and the observed data. The χ^2/df value of 2.18 is below the commonly applied criterion of 3.00. The CFI (0.95), TLI (0.94), and GFI (0.93) indicate a good level of model fit. The RMSEA value of 0.059 is below 0.06, while the SRMR value of 0.047 is below 0.08, further supporting the adequacy of the proposed model. Taken together, these indices indicate that the proposed structural model provides an adequate representation of the observed data.

In addition, if Confirmatory Factor Analysis was conducted separately, the standardized factor loadings and CFA fit indices should be reported before presenting the structural model.

7. Qualitative Findings

After completion of the quantitative analysis, 20 key informants participated in the qualitative phase. The qualitative inquiry was designed specifically to explain and extend the quantitative findings.

The interview transcripts were analyzed using thematic analysis. The coding process combined deductive coding, based on the four quantitative explanatory constructs and the research objectives, with inductive coding, which allowed additional issues to emerge from the participants' accounts. Four principal themes were identified.

Theme 1: Structured Collaborative Governance

The first theme concerned the importance of clearly defined roles, responsibilities, coordination procedures, and joint decision-making between private higher education institutions and industry partners.

The participants emphasized that scholarship collaboration requires an organizational structure that clearly specifies responsibility for fund management, student selection, resource allocation, monitoring, reporting, and communication. This finding provides a qualitative explanation for the quantitative result showing that Collaboration Structure had the strongest effect on Student Potential Enhancement ($\beta = 0.32$).

Theme 1: Structured Collaborative Governance

1) The first theme, Structured Collaborative Governance, emerged from the interview data concerning the organizational arrangements required to support effective collaboration between private higher education institutions and industry partners. The findings indicate that effective scholarship fund management depends on clearly defined roles, shared decision-making processes, effective inter-organizational coordination, and clearly assigned responsibilities for scholarship administration.

Table 7

Coding Structure for Theme 1: Structured Collaborative Governance

Initial Code	Subtheme	Main Theme
Defined roles of university and industry	Clearly defined	Structured
	organizational roles	Collaborative
		Governance

Initial Code	Subtheme	Main Theme
Joint determination of scholarship criteria	Shared decision-making	Structured
		Collaborative
		Governance
Regular communication among partners	Inter-organizational coordination	Structured
		Collaborative
		Governance
Assigned responsibility for fund administration	Clearly assigned administrative responsibility	Structured
		Collaborative
		Governance

The qualitative findings provide an explanation for the quantitative result showing that Collaboration Structure had the strongest positive effect on Student Potential Enhancement ($\beta = 0.32$, $t = 5.87$, $p < .001$). The interview findings suggest that a clearly structured collaborative arrangement provides the organizational foundation for effective scholarship administration and facilitates coordinated efforts to enhance students' potential.

Summary of the Qualitative Findings

Taken together, the four themes demonstrate that strategic scholarship fund management involves more than the provision of financial assistance. The interview findings indicate four interconnected dimensions: (1) structured collaborative governance, (2) sustainable resource mobilization and matching fund mechanisms, (3) transparency, accountability, and stakeholder trust, and (4) employment-oriented monitoring and evaluation.

The qualitative findings therefore provide explanatory depth to the quantitative model. The quantitative phase established significant positive relationships between the four dimensions and Student Potential Enhancement, whereas the qualitative phase identified the organizational and operational mechanisms through which these relationships may be implemented in practice. In particular, matching fund mechanisms provide a mechanism for strengthening resource sustainability, while employment-oriented KPIs provide a mechanism for connecting scholarship outcomes with labor-market needs.

8. Integration of Quantitative and Qualitative Findings

The qualitative findings were integrated with the quantitative findings to explain how and why the identified collaboration mechanisms contributed to Student Potential Enhancement.

Table 8

Joint Display: Integration of Quantitative and Qualitative Findings

Quantitative Finding	Qualitative Theme	Explanation/Extension	Integrated Interpretation
Collaboration Structure had the strongest effect ($\beta = 0.32, p < .001$)	Structured Collaborative Governance	Participants emphasized defined roles, coordination, and shared decision-making	A clearly structured collaboration mechanism provides an organizational foundation for effective scholarship management and

Quantitative Finding	Qualitative Theme	Explanation/Extension	Integrated Interpretation
			student development
Resource Mobilization significantly influenced Student Potential Enhancement ($\beta = 0.27, p < .01$)	Sustainable Resource Mobilization and Matching Funds	Participants identified matching funds and shared financial responsibility	Sustainable resource mobilization depends on mechanisms that distribute financial responsibility among participating organizations
Governance and Transparency significantly influenced Student Potential Enhancement ($\beta = 0.24, p < .01$)	Transparency, Accountability, and Stakeholder Trust	Participants emphasized transparent selection, reporting, accountability, and communication	Transparent governance can strengthen stakeholder confidence and support sustained collaboration
Monitoring and Evaluation significantly influenced Student	Employment-Oriented Monitoring and Evaluation	Participants emphasized employment-oriented KPIs and follow-up of student development	Evaluation should extend beyond scholarship disbursement to student

Quantitative Finding	Qualitative Theme	Explanation/Extension	Integrated Interpretation
Potential Enhancement ($\beta = 0.29$, $p < .001$)			development and labor-market-related outcomes

The joint display demonstrates that the qualitative phase explained and extended the quantitative findings. The quantitative analysis established statistically significant relationships among the four collaboration mechanisms and Student Potential Enhancement, while the qualitative findings provided contextual explanations concerning the mechanisms through which these relationships may operate.

The qualitative findings also identified specific operational mechanisms that were not directly represented in the quantitative model, particularly matching fund mechanisms and employment-oriented KPIs. These findings therefore extend the interpretation of the quantitative results and provide practical dimensions for the development of the strategic scholarship fund guideline framework.

9. Integrated Findings for the Guideline Framework

The integrated results indicate that strategic scholarship funds can be conceptualized as a coordinated human-capital development mechanism comprising four interconnected dimensions: collaboration structure, resource mobilization, governance and transparency, and monitoring and evaluation.

The quantitative findings demonstrated that all four dimensions were positively and significantly associated with Student Potential Enhancement, with the model explaining 63% of the variance in the outcome. The qualitative findings subsequently clarified the practical mechanisms underlying these relationships.

In particular, the qualitative evidence highlighted the importance of clearly defined collaborative roles, matching fund mechanisms, transparent and accountable fund administration, and employment-oriented performance indicators.

Taken together, the findings provide an empirical basis for developing guidelines for establishing and managing strategic scholarship funds between private higher education institutions and national industry representative organizations. The integrated framework therefore connects organizational collaboration and resource mechanisms with governance and evaluation processes, ultimately supporting student potential enhancement and stronger alignment with labor-market needs.

Discussion of Results

The findings demonstrate that collaboration structure, resource mobilization, governance and transparency, and monitoring and evaluation all had significant positive effects on Student Potential Enhancement in the context of Thai private higher education institutions. The structural model explained 63% of the variance in Student Potential Enhancement ($R^2 = 0.63$), indicating that institutional mechanisms surrounding strategic scholarship funds are substantially associated with the development of student potential. (Kanjaporn Srimongkol, 2022). The findings are particularly

important because they shift the interpretation of scholarship funds from being primarily a financial-support mechanism toward being an institutional mechanism for human-capital development and university–industry collaboration.

The discussion is organized around four major findings and then synthesizes their implications through the Triple Helix Model, Human Capital Theory, and the proposed Strategic Scholarship Fund Model.

1. Collaboration Structure and the Triple Helix Perspective
Collaboration Structure had the strongest positive effect on Student Potential Enhancement ($\beta = 0.32$, $t = 5.87$, $p < .001$). This result suggests that the effectiveness of strategic scholarship funds depends not only on the amount of financial resources provided but also on how participating organizations structure their relationships, responsibilities, coordination mechanisms, and decision-making processes.(Kanchanrat Sinthurat, 2016). This finding is consistent with the central proposition of the Triple Helix Model, which conceptualizes university–industry–government relationships as an evolving system of institutional interaction, communication, negotiation, and coordination rather than as isolated activities conducted independently by each sector. Etzkowitz and Leydesdorff emphasize that interactions among institutional partners can generate new organizational arrangements and reshape the relationships among universities, industry, and government.

The present findings extend this perspective in an important way. Much of the Triple Helix literature has focused on innovation, research, technology transfer, and knowledge commercialization. In contrast, the

present study applies the logic of institutional interaction to strategic scholarship fund governance and student human-capital development. In this context, collaboration is not merely an external partnership activity; it becomes an organizational infrastructure through which universities and industry partners jointly define priorities, allocate resources, select beneficiaries, monitor outcomes, and connect educational development with workforce requirements.

The qualitative findings reinforce this interpretation. The theme Structured Collaborative Governance showed that clearly defined organizational roles, shared decision-making, inter-organizational coordination, and clearly assigned scholarship-administration responsibilities were considered important by the interview participants. Thus, the quantitative finding that Collaboration Structure had the largest path coefficient is supported by qualitative evidence indicating that structural clarity provides the foundation for implementing the other dimensions of the scholarship fund. (Kwanpitcha Meekaew, 2019). This result is also relevant to the Thai context. Previous Thai research using a Triple Helix-based university outreach project found that sustained interaction among government, universities, and industry could strengthen university-based collaborative activities and contribute to broader social and economic development, although challenges concerning the commercialization of academic knowledge remained. The present study extends this Thai evidence from research and outreach activities to student-oriented financial and human-capital development.

However, the findings also suggest a critical qualification to the Triple Helix perspective. Simply having university–industry relationships does

not necessarily produce effective outcomes. The present evidence indicates that the structure and institutionalization of the relationship matter. Informal cooperation or one-time corporate social responsibility activities may provide short-term support, but a strategic scholarship fund requires defined governance arrangements, continuous coordination, and shared accountability. Therefore, the contribution of the present study is not simply to confirm the relevance of university–industry collaboration, but to identify collaborative structure as an operational mechanism through which collaboration can translate into student outcomes.

2. Resource Mobilization, Matching Funds, and Human Capital Theory Resource Mobilization had a significant positive effect on Student Potential Enhancement ($\beta = 0.27$, $t = 4.21$, $p < .01$). This finding indicates that financial resources are an important component of scholarship effectiveness, but the qualitative findings suggest that the strategic value of resource mobilization extends beyond increasing the amount of funding available. (Lefifi, Kiala, 2021). The result is consistent with Human Capital Theory, particularly Becker's argument that education and training constitute investments that can generate returns through improved skills, employment, productivity, and income. From this perspective, scholarship expenditure can be understood as an investment in students' capabilities rather than simply as a transfer of financial assistance.

The qualitative findings add an important dimension to this theoretical interpretation. The theme Sustainable Resource Mobilization and Matching Fund Mechanisms indicated the importance of matching funds, shared financial responsibility, diversification of funding sources, and long-

term resource sustainability. These mechanisms suggest that the strategic value of a scholarship fund depends not only on how much money is provided but also on whether the funding structure creates a sustained commitment among participating institutions and industry partners. (Nuphasuk, 2015). This finding is particularly relevant to Thailand because university–industry cooperation has also been discussed as a mechanism for addressing skill and labor-quality mismatches. Research on Thai industry has identified university–firm cooperation as one of several approaches used to address skill gaps, while also noting that different approaches face different constraints and that no single cooperation mechanism is universally applicable across industries.

The present findings therefore suggest that scholarship funds can serve as an additional institutional mechanism for addressing this problem. Rather than treating scholarships as philanthropic contributions detached from employment outcomes, a strategic fund can link financial investment → competency development → work readiness → employment-related **outcomes**. This interpretation is consistent with Human Capital Theory because the scholarship represents an investment whose value is realized through the development of capabilities. Nevertheless, a critical interpretation is necessary. (Sa-nguan-nam, 2010). Financial resources alone should not be assumed to produce better student outcomes. The structural model demonstrates that Resource Mobilization is significant, but its coefficient is lower than that of Collaboration Structure. This indicates that money without an effective collaborative structure may be insufficient. The qualitative finding concerning matching funds reinforces this point: financial

sustainability requires institutional arrangements that establish who contributes, how resources are allocated, and how outcomes are monitored.

3. Governance, Transparency, and Institutional Trust. Governance and Transparency had a significant positive effect on Student Potential Enhancement ($\beta = 0.24$, $t = 3.98$, $p < .01$). Although this coefficient was lower than those of Collaboration Structure, Monitoring and Evaluation, and Resource Mobilization, the result remains statistically significant and substantively important because scholarship funds involve decisions concerning eligibility, resource allocation, financial administration, and accountability. (Ukwaththa, et. al., 2025). The qualitative findings provide a deeper explanation through the theme Transparency, Accountability, and Stakeholder Trust. Participants emphasized transparent student selection, financial accountability, reporting and disclosure, stakeholder participation, and institutional trust. These findings suggest that governance functions as a relational mechanism: transparency does not merely satisfy administrative requirements but can also strengthen confidence among universities, industry partners, students, and other stakeholders.

This interpretation complements the Triple Helix perspective because institutional collaboration requires repeated interaction among organizations with different objectives and resources. The Triple Helix literature emphasizes communication and negotiation among institutional partners as important elements in the evolution of collaborative arrangements. In a scholarship-fund context, transparency can therefore be understood as part of the infrastructure that makes such repeated interaction sustainable.

A critical issue emerging from the present study is that governance should not be reduced to financial compliance. Effective governance encompasses the transparency of student selection, clarity of responsibilities, participation in decision-making, reporting of outcomes, and mechanisms for addressing stakeholder concerns. In this sense, governance is closely connected with the legitimacy of the scholarship fund.

The relatively lower coefficient for Governance and Transparency compared with Collaboration Structure should therefore not be interpreted as indicating that governance is unimportant. Rather, the finding may indicate that governance mechanisms operate partly as enabling conditions for other processes. For example, transparent governance can facilitate industry confidence, which may encourage continued resource contributions; similarly, accountability can strengthen the credibility of monitoring and evaluation results.

4. Monitoring and Evaluation and Strategic Sustainability. Monitoring and Evaluation had a significant positive effect on Student Potential Enhancement ($\beta = 0.29$, $t = 5.12$, $p < .001$), making it the second strongest predictor in the structural model. This finding indicates that the effectiveness of a strategic scholarship fund depends not only on establishing partnerships and mobilizing resources but also on systematically assessing whether the program produces meaningful student outcomes. The qualitative findings deepen this result through the theme Employment-Oriented Monitoring and Evaluation. Participants emphasized student-development monitoring, competency and work-readiness indicators, employment-oriented KPIs, graduate follow-up, and labor-market alignment. (Zhang, Wei, 2024). This

finding is particularly important because it challenges a narrow conception of scholarship success based primarily on the number of students receiving financial assistance. From a strategic perspective, the relevant question is not only “How many students received scholarships?” but also “What capabilities and employment-related outcomes resulted from the investment?” This interpretation is consistent with the Human Capital perspective, in which the value of educational investment is associated with the capabilities and economic outcomes generated from education and training. It also corresponds with evidence from Thailand concerning labor-quality mismatch and the need for stronger university–firm cooperation in developing relevant skills.

The present study therefore proposes that monitoring and evaluation should move from an input-oriented model toward an outcome-oriented model. Inputs include financial contributions and the number of scholarship recipients; processes include student support and institutional coordination; outputs include competencies and work readiness; and longer-term outcomes include graduate employment and alignment with labor-market requirements.

A critical implication is that employment-oriented KPIs should not be interpreted as requiring universities to judge educational value exclusively through immediate employment outcomes. Student development includes academic, professional, and broader developmental dimensions. Employment indicators should therefore complement rather than replace educational and developmental indicators.

5. Integrated Interpretation: From Scholarship Provision to Strategic Human-Capital Development. Taken together, the four findings indicate that

the effectiveness of a strategic scholarship fund is produced through an interdependent institutional system rather than through any single mechanism. The structural model demonstrates that all four dimensions significantly contribute to Student Potential Enhancement, while the qualitative findings explain the mechanisms underlying those statistical relationships. Collaboration Structure establishes the institutional foundation; Resource Mobilization provides sustainable resources; Governance and Transparency establish legitimacy and accountability; and Monitoring and Evaluation create feedback concerning whether resources and activities produce meaningful student outcomes.

Knowledge Contribution

This study contributes to the body of knowledge in three principal dimensions: theoretical advancement, methodological development, and policy-practical implications.

1. Theoretical Contribution

First, this research extends university–industry collaboration literature beyond traditional domains such as research commercialization and curriculum alignment into the relatively underexplored area of strategic scholarship fund governance, particularly within private higher education institutions in developing countries.

The study integrates three major theoretical perspectives: The Triple Helix Model, Human Capital Theory, Governance Theory into a unified framework explaining how structured collaboration mechanisms influence student potential enhancement. Importantly, this study reconceptualizes industry-supported scholarships as a strategic co-investment mechanism in

human capital development rather than a philanthropic or CSR-oriented initiative. This reframing advances theoretical understanding of industry participation in higher education systems.

2. Methodological Contribution

This study develops and empirically validates a structural model measuring the relationships between: Collaboration structure, Resource mobilization mechanisms, Governance and transparency, Monitoring and evaluation systems and student potential enhancement outcomes.

The validated framework can be adapted to other national contexts with similar higher education structures. Furthermore, the mixed-methods approach enhances explanatory depth, particularly regarding institutional governance dynamics.

3. Policy and Practical Contribution

The research proposes a structured guideline framework for establishing collaborative scholarship funds between private universities and national industry representative organizations.

Key practical contributions include: Institutionalized joint governance mechanisms, Matching fund systems, Employment-oriented performance indicators, Transparent reporting standards

These findings provide a policy-relevant model for strengthening sustainable human capital development strategies in Thailand and comparable economies.

Recommendations

Based on the findings that collaboration structure, resource mobilization mechanisms, governance systems, and monitoring frameworks

significantly influence student potential enhancement, the following recommendations are proposed at three levels:

1. Policy-Level Recommendations

1.1 Establish a National University–Industry Scholarship Fund Framework. Government agencies should facilitate the creation of a national-level collaborative fund network, coordinated by chambers of commerce and industry councils.

1.2 Promote Matching Fund Incentives. Tax incentives or financial benefits should be provided to encourage industry participation in scholarship co-investment programs.

1.3 Develop Standardized Governance Guidelines. National standards for transparency, accountability, and performance measurement should be implemented to ensure sustainability and stakeholder trust.

2. Institutional-Level Recommendations

2.1 Create Joint Governance Boards

Universities and industry partners should formalize collaboration through structured joint committees overseeing scholarship operations.

2.2 Integrate Employment-Based KPIs

Scholarship programs should incorporate employability and industry-alignment indicators into their evaluation frameworks.

2.3 Implement Graduate Tracking Systems

Institutions should establish systematic tracking mechanisms to assess long-term employment outcomes and social return on investment.

2.4 Ensure Financial Sustainability

Universities should consider establishing endowment-based scholarship funds to support long-term stability.

3. Recommendations for Future Research

3.1 Examine Moderating Variables

Future studies may explore institutional readiness and industry engagement intensity as moderating factors.

3.2 Conduct Comparative Studies

Comparative analysis between public and private institutions could provide deeper structural insights.

3.3 Undertake Longitudinal Research

Long-term impact assessment on graduate career progression would strengthen empirical understanding.

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