

Entrepreneurial Transformation Strategies for Sustainable Private Universities

Indah Kusuma Hayati^{1*} , Muhammad Syamsul Maarif² , Illah Sailah³ , Nimmi Zulbainarni⁴ 

^{1,2,4}School of Business, IPB University, Indonesia

¹Faculty of Economics and Business, Binaniaga Indonesia University, Indonesia

³Department of Agroindustrial Technology, IPB University, Indonesia

¹fadilah73.indah@apps.ipb.ac.id, ²msyamsul@apps.ipb.ac.id, ³illahsailah@apps.ipb.ac.id, ⁴nimmizu@apps.ipb.ac.id

*Corresponding Author

Article Info

Article history:

Submission July 12, 2025

Revised September 18, 2025

Accepted September 21, 2026

Published October 8, 2026

Keywords:

Entrepreneurial University

Private University

FAHP

Sustainability

Organization Transformation



ABSTRACT

Private universities face increasing challenges arising from financial constraints, growing competition, and changing societal expectations, requiring them to adopt entrepreneurial transformation strategies to ensure long-term sustainability. While the entrepreneurial university concept has been widely discussed, practical strategic frameworks for guiding transformation in private universities, particularly in developing countries, remain limited. **This study aims to develop a strategic decision-making framework for transforming private universities into entrepreneurial universities and to identify the priority factors, actors, objectives, and strategies supporting sustainable institutional development. The study employs the Fuzzy Analytic Hierarchy Process (FAHP), using expert judgments from seven higher education stakeholders representing six private universities and one government institution in Indonesia. The results indicate that leadership and governance are the most influential transformation factors, followed by financial and funding resources, entrepreneurial culture, human resources, and infrastructure and technology. Universities emerge as the primary actors driving transformation, while improving graduate quality is identified as the highest-priority objective. Among the alternative strategies, strengthening human resources ranks first, followed by enhancing collaboration, integrating entrepreneurship into the curriculum, and promoting innovation-based research and commercialization. These findings provide a systematic framework for supporting entrepreneurial transformation in private universities and contribute to the organizational change literature by offering practical guidance for strengthening institutional sustainability, competitiveness, and societal impact through leadership, human resource development, collaboration, and innovation.**

This is an open access article under the [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/) license.



DOI: <https://doi.org/10.34306/att.v8i3.792>

This is an open-access article under the CC-BY license (<https://creativecommons.org/licenses/by/4.0/>)

©Authors retain all copyrights

1. INTRODUCTION

Universities are pivotal in national development by producing high-quality human resources, advancing science and technology, and serving as research and innovation centres [1, 2]. Beyond these roles, they are expected to contribute to society and the economy, often called their “third mission,” generating public value via knowledge and innovation [3, 4]. In doing so, universities also support Sustainable Development

Goals (SDGs), especially SDG 4 (Quality Education) and SDG 8 (Decent work and Economic Growth). They achieve this by providing quality education, enhancing students' competencies, fostering innovation, creating economic opportunities through research, and strengthening universities capacity to contribute to sustainable economic growth. In Indonesia, private universities account for 70% of higher education institutions and play a vital role in expanding access to education in the country [5]. To enhance competitiveness, private universities emphasize the creation of unique value in line with their mission, which shapes their identity and areas of excellence [6]. However, many private universities face challenges such as limited funding, high dependence on tuition fees, and changing society expectation [6].

To address these challenges, private universities must strengthen adaptability and cultivation an entrepreneurial mindset [7, 8]. Embedding entrepreneurial values into institutional culture allows universities to integrate innovation into academic and managerial processes, generating tangible societal and economic impact. The entrepreneurial university model has emerged as a strategic approach for ensuring long-term relevance and resilience. Although the concept originated in the late 19th century, its adoption in private universities, particularly in developing countries, remains limited. Most prior studies focus on public universities in developed nations and are largely conceptual or narrative. Consequently, there is a lack of research offering clear and practical strategies for private universities in developing countries. Without such guidance, private universities risk lagging in innovation, social contribution, competitiveness, and sustainability.

This study addresses the gap by developing a strategic framework for transforming private universities into entrepreneurial universities. Using the Fuzzy Analytical Hierarchy Process (FAHP), the study regularly prioritizes strategic factors, accounts for uncertainty and subjectivity in decision-making, and provides quantitative guidance. The study aims to identify a comprehensive transformation framework, examine the role of key stakeholders, and develop objectives and alternative strategies to support institutional sustainability.

2. LITERATURE REVIEW

This section presents the theoretical background relevant to the study. It reviews the concepts of entrepreneur, intrapreneur, and entrepreneurial behavior, followed by the entrepreneurial university concept, which serves as the foundation for developing the proposed transformation framework.

2.1. The Concepts of Entrepreneurship, Intrapreneurship, and Entrepreneurial Behavior in Organizations

The concept of entrepreneurship has expanded from creating new businesses to driving innovation within existing organizations. Entrepreneurs are individuals who develop new products or services through creativity and innovation [9, 10]. Entrepreneurial success is influenced by internal and external factors, as well as effective organizational strategies that improve performance. As the demand for entrepreneurial employees increases, the concept of the intrapreneur has become more prominent. An intrapreneur is an individual who innovates and demonstrates strong commitment while working within an organization as if it were their own [11, 12]. This concept is built on three key dimensions: innovation, organizational change, and proactive behavior, which together foster organizational intelligence [13].

2.2. Entrepreneurial University

The entrepreneurial university concept emerged as universities sought to reduce reliance on tuition fees and government funding by commercializing research outcomes [12]. This transformation emphasizes innovation, intrapreneurship, and opportunity creation while strengthening collaboration, knowledge transfer, and research commercialization to promote innovation, economic growth, and societal development [13–18].

There are five key elements in developing an entrepreneurial university: establishing research groups, producing commercially valuable research, protecting intellectual property, managing university-affiliated companies and graduate ventures, and integrating academic and business functions through research centres [19, 20]. The first two elements characterize a research university, the third marks the transition to an entrepreneurial university, and the final two indicate its full transformation.

3. RESEARCH METHOD

This section presents the research methodology, including the research design, data collection, participant selection, and FAHP analysis.

3.1. Research Design and Approach

This study uses a descriptive-explanatory approach to address complex issues in designing a strategic framework for transforming private universities into entrepreneurial university. The Multi-Criteria Decision Analysis (MCDA) method was used. Among MCDA techniques, FAHP was selected. This method can handle uncertainty and subjectivity in strategic decision-making. It also provides quantitative priorities for multiple criteria and alternatives [21, 22].

3.2. Data Collection and Participants

This study used primary and secondary data. Primary data were collected from expert respondents through structured questionnaires, while secondary data were obtained from the literature. The study involved six private universities in Jakarta implementing entrepreneurial university principles. Experts were selected using purposive sampling based on relevant leadership, research, or business incubation experience.

Table 1. Expert Respondent Profile

No	Title	Institution	Total
1	Rector	Private Universities	3
2	Head of Study Program	Private Universities	1
3	Head of the Institute of Research and Community Service	Private Universities	1
4	Head of Business Incubator	Private Universities	1
5	LLDIKTI Region III Coordinator	Government	1
Total			7

A total of seven experts participated Table 1. The number of experts in the MCDM approach usually ranges from 3 to 10, but there is not strict limit specified in the literature for AHP [22]. The sample size was considered sufficient to capture diverse expert judgments while remaining feasible for pairwise comparisons.

3.3. FAHP Implementation

This subsection describes the hierarchical decision structure and the implementation steps of the FAHP used in this study.

3.3.1. Hierarchical Structure

The FAHP analysis was structured into five levels:

- Focus: Strategic transformation of private universities into entrepreneurial university for sustainability.
- Factors: leadership and governance (F1), entrepreneurial culture (F2), human resources (F3), infrastructure and technology (F4), and financial and funding resources (F5).
- Actors: universities (A1), government (A2), industry (A3), start-ups (A4), financial institutions (A5), and the community and SMEs (A6).
- Objectives: improve graduate quality (O1), enhancement of institutional competitiveness (O2), an increase in social and economic contributions to society (O3), and financial sustainability through revenue diversification (O4).
- Alternative Strategies: Strengthening of supportive internal policies (S1), strengthening human resources (S2), strengthening of curriculum integrated with entrepreneurship (S3), strengthening of innovations based and impactful research (S4), strengthening collaborations (S5), strengthening of infrastructure & digitalization (S6) and enhancing the university's international reputations.

3.3.2. FAHP Steps

The FAHP analysis employed the geometric mean method. This approach is considered more realistic and flexible in capturing uncertain expert judgments. According to [23, 24], there are five main stages Figure 1:

- Construct fuzzy pairwise comparison matrices using Triangular Fuzzy Numbers (TFNs) to represent the relative importance of each criterion Table 2.

- Consistency check: compute Consistency Ratio (CR), ensuring $CR < 0.1$ for acceptable consistency.
- Calculating the fuzzy geometric mean, aggregate fuzzy comparisons for each criterion to determine the fuzzy importance value.
- Fuzzy weight calculation, normalize fuzzy importance values to obtain fuzzy weights comparisons for each criterion to determine the fuzzy importance value weight.
- Fuzzy synthetic and defuzzification. Convert fuzzy weight to crisp values using the Centre of Area (CoA) method for final prioritization.

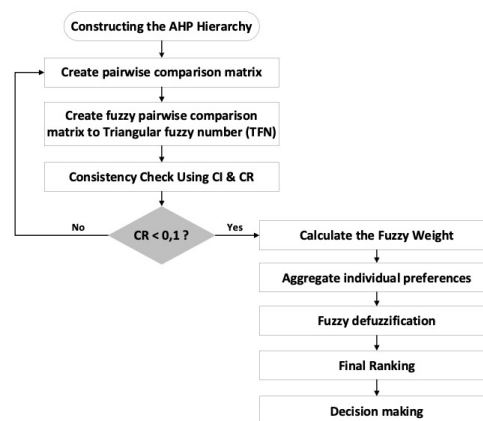


Figure 1. Fuzzy AHP Process

Source: Adapted from [24]

Figure 1 presents the main stages of the Fuzzy AHP process, from hierarchy construction and consistency checking to final ranking and decision-making.

$$\begin{bmatrix} (1,1,1) & & \dots \\ & (1,1,1) & \dots \\ & & \dots & (1,1,1) \end{bmatrix}$$

Figure 2. Constructing a fuzzy pairwise comparison

Source: [23]

The fuzzy pairwise comparison matrix $\tilde{D} = [\tilde{a}_{ij}]$, is constructed to represent the relative importance between criteria, using TFNs as shown in Figure 2 and Table 2.

Table 2. Triangular Fuzzy Numbers (TFN)

Linguistic Variables	Positive Triangular	Positive Reciprocal
	Fuzzy Number	TFN
Extremely strong	(9, 9, 9)	(1/9, 1/9, 1/9)
Intermediate	(7, 8, 9)	(1/9, 1/8, 1/7)
Very strong	(6, 7, 8)	(1/8, 1/7, 1/6)
Intermediate	(5, 6, 7)	(1/7, 1/6, 1/5)
Strong	(4, 5, 6)	(1/6, 1/5, 1/4)
Intermediate	(3, 4, 5)	(1/5, 1/4, 1/3)
Moderately Strong	(2, 3, 4)	(1/4, 1/3, 1/2)
Intermediate	(1, 2, 3)	(1/3, 1/2, 1)
Equally Strong	(1, 1, 1)	(1, 1, 1)

Source: [25]

Table 2 shows the TFN scale that transforms linguistic variables into fuzzy and reciprocal values for pairwise comparison analysis. The next step is to calculate the geometric mean to obtain the importance value ($\tilde{r}_i$) of each criterion [23, 24].

$$\tilde{r}_i = (\tilde{a}_{i1} \times \tilde{a}_{i2} \times \cdots \times \tilde{a}_{in})^{1/n} \quad (1)$$

Afterwards, the fuzzy weight ($\tilde{w}_i$) for each criterion is calculated by multiplying the fuzzy importance value ($\tilde{r}_i$) by the inverse of the total sum of all $\tilde{r}_i$ values. This normalization procedure converts the fuzzy importance values into comparable priority weights, ensuring that the contribution of each criterion is evaluated relative to the others. The resulting fuzzy weights preserve the uncertainty associated with expert judgments while providing a consistent basis for ranking criteria and supporting strategic decision-making [23, 24]. The formula used is as follows:

$$\tilde{w}_i = \tilde{r}_i \times (\tilde{r}_1 + \tilde{r}_2 + \cdots + \tilde{r}_n)^{-1} \quad (2)$$

Here, $\tilde{r}_k$ represents a TFN, expressed as (l_k, m_k, u_k) , and its inverse is obtained by reversing the position of each bound as follows:

$$(\tilde{r}_k)^{-1} = \left(\frac{1}{u_k}, \frac{1}{m_k}, \frac{1}{l_k} \right) \quad (3)$$

CR value of less than 0.1 [20]. CR is calculated by dividing the Consistency Index (CI) by the Random Index (RI), when CI is derived from the maximum eigenvalue ($\lambda_{\max}$), and RI is the average random index based on matrix size, as show in Table 3.

$$\sum_{j=1}^n a_{ij} w_j = \lambda_{\max} \quad (4)$$

$$CI = \frac{\lambda_{\max} - n}{n - 1} \quad (5)$$

$$CR = \frac{CI}{RI} \quad (6)$$

Table 3 presents the Random Consistency Index (RI) values used to evaluate the consistency of pairwise comparison matrices based on their size.

Table 3. RI										
N	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

Source: [20]

To determine the crisp (non-fuzzy) weight, a defuzzification process is performed using the CoA method to generate the non-fuzzy value [23]:

$$\tilde{w}_i = \frac{l_i + m_i + u_i}{3} \dots \dots \dots (7)$$

The next step is weight synthesis, which involves combining the final weights from each level of the hierarchical structure to obtain the final priority weight. The global weight obtained from this process serves as the basis for ranking the elements at each level according to their priority.

4. RESULTS AND DISCUSSION

4.1. Result

The decision-making hierarchy in this study is structured into five levels to facilitate the identification of priority strategies for transforming private universities into entrepreneurial institutions. The criteria at each hierarchical level were developed based on expert interviews and a comprehensive literature review. The FAHP hierarchical structure is illustrated in Figure 3.

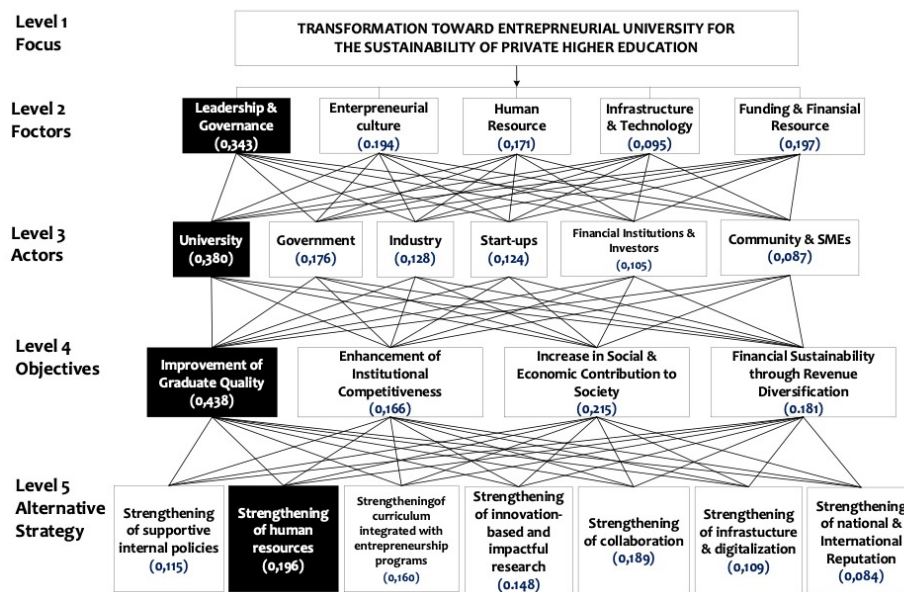


Figure 3. FAHP model

All CR were below 0.1, indicating that the respondents demonstrated consistency in their responses Table 4.

Table 4. Summary CR for Pairwise Comparisons

No.	Pairwise Comparison	Lamda	CI	RI	CR
1	Focus → Factor (F)	5.236	0.059	1.12	0.053
2	Leadership & Governance (F1) → Actors (A)	6.055	0.011	1.24	0.009
3	Entrepreneurial Culture (F2) → Actors (A)	6.252	0.050	1.24	0.041
4	Human Resource (F3) → Actors (A)	6.040	0.008	1.24	0.006
5	Infrastructure & Technology (F4) → Actors (A)	6.093	0.019	1.24	0.015
6	Funding & Financial Resource (F5) → Actors (A)	6.071	0.014	1.24	0.011
7	University (A1) → Objectives (O)	4.101	0.034	0.9	0.037
8	Government (A2) → Objectives (O)	4.004	0.001	0.9	0.001
9	Industry (A3) → Objectives (O)	4.015	0.005	0.9	0.006
10	Start-ups (A4) → Objectives (O)	4.029	0.010	0.9	0.011
11	Financial Institutions & Investors (A5) → Objectives (O)	4.026	0.009	0.9	0.010
12	Community & SMEs (A6) → Objectives (O)	4.013	0.004	0.9	0.005
13	Improvement of Graduate Quality (O1) → Alternative Strategy (S)	7.192	0.032	1.32	0.024
14	Enhancement of Institutional Competitiveness (O2) → Alternative Strategy (S)	7.112	0.019	1.32	0.014
15	Increase in Social & Economic Contribution to Society (O3) → Alternative Strategy (S)	7.228	0.038	1.32	0.029
16	Financial Sustainability through Revenue Diversification (O4) → Alternative Strategy (S)	7.158	0.026	1.32	0.020

Source: Results of Primary Data Processing (2025)

Table 4 summarizes the consistency test results for all pairwise comparison matrices used in the FAHP analysis. The CR values range from 0.001 to 0.053, all of which are below the acceptable threshold of 0.10. These results indicate that the experts' judgments are sufficiently consistent, confirming the reliability of the pairwise comparisons and supporting the validity of the subsequent priority weight calculations.

4.1.1. Level Focus

Universities are facing increasing competition and declining student enrolment, threatening the sustainability of private universities. Transforming into an entrepreneurial university provides a strategic response by fostering entrepreneurial mindsets, adaptability, and innovation. Based on the interview findings, the primary objective of this transformation is to ensure long-term institutional sustainability. The FAHP results further indicate that achieving this goal requires strengthening internal capabilities, cultivating an entrepreneurial culture, and creating greater societal value [5, 6].

4.1.2. Level of Factors

Five factors drive the transformation toward an entrepreneurial university, leadership and governance, entrepreneurial culture, human resources, infrastructure and technology, and funding and financial resources. As shown in Table 5, leadership and governance are the most influential factor (34.3%), providing strategic direction and effective governance to support organizational transformation [26, 27]. Funding and financial resources rank second (19.7%), enabling innovation and entrepreneurial activities while encouraging universities to diversify income through research commercialization and knowledge-based services [27, 28].

Table 5. Priority Weights of Factors Driving the Transformation Toward Becoming Entrepreneurial University to Ensure Private University Sustainability

No	Factor	Global Weight	Rank
1	Leadership & Governance	0.343	1
2	Entrepreneurial Culture	0.194	3
3	Human Resource	0.171	4
4	Infrastructure & Technology	0.095	5
5	Funding & Financial Resource	0.197	2

Source: Results of Primary Data Processing (2025)

In Table 5 the third factor is entrepreneurial culture (19.4%), vital for successfully implementing the entrepreneurial university concept. This culture encourages innovation and creativity, actively motivating students, faculty, and staff to develop now solution [29, 30]. Human resources occupy the fourth position at 17.1%. High-quality staff with relevant skills, knowledge, and creativity, provide a sustainable competitive advantage. Therefore, human resources development is central to a university's ability to adapt, innovate and implement the entrepreneurial university concept [31]. Infrastructure and technology (9.5%) are the final factors, crucial in facilitating entrepreneurial activity and encouraging collaboration. Essential elements such as business incubators and technology centres help foster innovation and technological advancements. Technology underpins scientific progress in today's globalized world and is central to the innovation ecosystem necessary for entrepreneurial university [28].

4.1.3. Level of Actors

Table 6 presents the global weights and rankings of the actors involved in developing an entrepreneurial university.

Table 6. Priority Weights of the Level of Actors

No	Actors	Global Weight	Rank
1	University	0.380	1
2	Government	0.176	2
3	Industry	0.128	3
4	Start-ups	0.124	4
5	Financial Institutions & Investors	0.105	5
6	Community & SMEs	0.087	6

Source: Results of Primary Data Processing (2025)

Table 6 shows that universities are the primary actors (38%) in determining transformation strategies toward becoming entrepreneurial. The foundation, university leadership, academic staff, administrative personnel, and students are key stakeholders. At the individual level, the transformation involves a shift in

mindset and values that encourages entrepreneurial behaviour among staff, faculty and students. At the group level, it includes changes in dedicated entrepreneurial units such as knowledge transfer officers and business incubators. At the collective and organizational levels, transformation is reflected through increased collaboration and the university's role in managing multidimensional change [32, 33]. The government ranks second (17.6%) and plays a key role as a policymaker [34], funding provider [35], facilitator of university-industry collaboration [36], and supporter of research commercialization [37]. These roles help universities enhance their contributions to economic, social, and technological development. The third rank is industry (12.8%). They contributing significantly to knowledge transfer through strategic partnerships. These partnerships benefit both sides. The industry gains access to innovative technologies from academic research, while universities receive additional funding through research commercialization and practical insights for curriculum development [38]. Start-ups (12.4%) foster an entrepreneurial ecosystem in the university environment. Entrepreneurship programs, success stories, and business incubators help motivate students and provide essential support for their ventures, including mentoring from idea generation to business development [39]. Financial institutions and investors (10.5%) are fifth, supporting universities entrepreneurial activities and research by providing seed funding [35]. Finally, the community and SMEs (8.7%) shape the entrepreneurial ecosystem by promoting local innovation, sharing knowledge, and providing access to resources. In return, universities strengthen their relationships with communities and contribute to socioeconomic development.

4.1.4. Level of Objectives

Table 7 presents the priority weights and rankings of the objectives for developing an entrepreneurial university. The priority weights indicate the relative importance of each objective, while the rankings reflect their contribution to supporting the transformation process.

Table 7. Priority Weights of the Level of Objectives

No	Objective	Global Weight	Rank
1	Improvement of Graduate Quality	0.438	1
2	Enhancement of Institutional Competitiveness	0.166	4
3	Increase in Social & Economic Contribution to Society	0.215	2
4	Financial Sustainability through Revenue Diversification	0.181	3

Source: Results of Primary Data Processing (2025)

Table 7 shows that producing quality graduates (43.8%) remains a primary goal for universities. Implementing the entrepreneurial university concept positively impacts graduate quality. An entrepreneurship-integrated curriculum provides students new experiences and knowledge, helping them develop entrepreneurial mindsets, behaviours, and skills. These programs also foster creativity, innovation, and adaptability [40]. The next goal is to increase social and economic contributions to society (21.5%), which aims to strengthen universities role in social development. The entrepreneurial university model encourages institutions to expand their traditional roles, primarily through the third mission [40, 41]. Today, universities are not only focused on teaching and research but also actively address social and industrial challenges. Financial sustainability through revenue diversification (18.1%) is the third goal. Universities with an entrepreneurial mindset are believed to have the ability to identify opportunities and create alternative income streams, such as through research commercialization, industry partnerships, and offering specialized programs or services [34, 42]. This enables them to reduce reliance on tuition fees and support long-term financial stability. The final goal of the transformation towards an entrepreneurial university is to increase the institutions competitiveness (16.6%). The concept of an entrepreneurial university enables institutions to drive knowledge development and economic growth, encouraging innovation and proactive strategies that significantly increase competitiveness [24, 43].

4.1.5. Level of Alternative Strategies

The FAHP analysis identified the relative importance of the proposed alternative strategies for supporting the transformation toward an entrepreneurial university. The priority weights indicate the significance of each strategy in achieving the transformation objectives, while the rankings highlight their relative order of importance. The complete priority weights and rankings are presented in Table 8.

Table 8. Priority Weights of Alternative Strategies

No	Alternative Strategy	Global Weight	Rank
1	Strengthening of supportive internal policies	0.115	5
2	Strengthening of human resources	0.196	1
3	Strengthening of curriculum integrated with entrepreneurship	0.160	3
4	Strengthening of innovation-based research and commercialization	0.148	4
5	Strengthening of collaboration	0.189	2
6	Strengthening of infrastructure & digitalization	0.109	6
7	Strengthening of national & international partnerships	0.084	7

Source: Results of Primary Data Processing (2025)

As shown in Table 8, strengthening human resources ranks as the top alternative strategy (19.6%). This is crucial for supporting the entrepreneurial university model, as human resources are the core of an organization's capabilities [44]. Key steps to strengthen human resources include effective management, recruitment of competent personnel, continuous training, a compensation system fostering entrepreneurship, and performance management. This strategy builds competent human resources and enhances motivation, innovation, entrepreneurial mindset, and adaptability.

The next strategy is enhancing collaboration (18.9%), both within and outside the university. Collaboration supports innovation and economic development by facilitating knowledge transfer, information sharing, and the application of new insights [45]. It also strengthens value co-creation between universities and industry. The third strategy is integrating entrepreneurial programs into the curriculum (16%). Entrepreneurship education is a key benchmark that equips students with practical skills, including strategic decision-making and an entrepreneurial mindset [46]. Then the strategy is strengthening innovation-based research and commercialization (14.8%) to support SDG 9: industry, innovation and infrastructure. Innovation-driven research enables universities to develop new technologies, address industry needs, and generate sustainable social impact. Digital technologies further enhance research and commercialization by improving data collection, facilitating global collaboration, and accelerating the dissemination of research findings. The fifth strategy is enhancing supportive internal policies (11.5%), including funding mechanisms and administrative support for entrepreneurial programs. Policies aligned with institutional practices are essential for sustaining entrepreneurship in higher education [46]. Structured incentive systems, for example, encourage innovation and entrepreneurial activities.

The last strategic alternative is strengthening infrastructure and digitalization (10.9%) to foster an entrepreneurial ecosystem. Technology Transfer Offices (TTOs), business incubators, science technology parks, and digitalization support innovation, collaboration, knowledge transfer, and access to broader networks [27]. They also facilitate collaboration with international partners and accelerate innovation. The final strategy is enhancing national and international reputation (8.4%). A strong reputation is a valuable asset that strengthens a university's position, attracts resources, promotes innovation, and supports entrepreneurial activities [47].

4.2. Discussion and Research Contribution to Transformative Strategies Toward Becoming an Entrepreneurial University

Successful university transformation requires strong leadership and transparent governance aligned with the institution's vision and mission. Leaders, from the rector to the head of the study program, play a crucial role in driving change, building trust, and strengthening entrepreneurial culture, human resources, infrastructure, and financial resource management [26, 48]. Strong leadership and governance also enable universities to respond to external challenges and implement innovative programs effectively [48]. By aligning institutional strategies, universities can contribute to SDG 4 (quality education), SDG 8 (decent work and economic growth), and SDG 9 (industry, innovation, and infrastructure). Through quality education, impactful research, and sustainable initiatives, universities produce graduates who are prepared for the labour market while generating long-term social and economic value.

Building an entrepreneurial culture is essential for developing entrepreneurial mindsets among faculty, students, and staff. This culture promotes values, attitudes, and behaviours that encourage innovation, creativity, risk-taking, openness to new ideas, and learning from failure [31, 49]. An entrepreneurial mindset

is increasingly important for graduates to adapt to the dynamic labour market [50]. University leaders play a central role by establishing policies, allocating resources, and creating governance structures that support startups, innovation labs, and industry collaboration [51]. These efforts foster a sustainable entrepreneurial ecosystem that generates lasting social, economic, and entrepreneurial impact. Improving graduates' quality remains the primary objective. A key indicator of an entrepreneurial university is students' interest in entrepreneurship. However, many students still prefer employment over creating new business opportunities, making entrepreneurial engagement a continuing challenge.

Therefore, collaboration with industry and workforce stakeholders is essential to ensure curriculum relevance and strengthen creativity, innovation, leadership, and risk-taking abilities. Emphasis should also be placed on digital literacy and technological innovation [52]. Practical activities, including startup competitions, incubators, workshops, and partnerships with industry and communities, provide hands-on experience, while digital tools enhance learning effectiveness [53]. Regular curriculum evaluation based on stakeholder feedback ensures alignment with economic and technological developments, contributing to SDG 4 through quality education and SDG 8 by preparing graduates for sustainable employment and economic growth.

Collaboration among universities, industry, government, and the community is essential for fostering innovation and entrepreneurship. These partnerships strengthen research, technology transfer, skill development, and research commercialization while providing students with practical experience through internships [54]. To sustain collaboration, private universities should establish clear goals, adopt digital technologies, invest in faculty and staff development, align with government policies, and secure external funding for research and innovation [36]. Regular monitoring and evaluation further enhance collaboration effectiveness and strengthen the entrepreneurial ecosystem to address societal challenges sustainably [24]. Research in private universities is generally focused on basic research and academic publications, with limited contribution to social and economic development. Interview findings revealed that low motivation and self-confidence among academics, despite existing incentives, remain major barriers to research development and commercialization.

Strengthening innovation-driven research and commercialization is therefore a key strategy. Universities can advance knowledge, develop new technologies, address industry needs, and generate social value [49]. To improve commercialization, private universities should establish dedicated research offices, strengthen industry partnerships, provide researcher incentives, and leverage digital tools to support data collection, collaboration, and dissemination of research outputs. Aligning research priorities with government policies and innovation funding further strengthens national innovation ecosystems and contributes to SDG 9. Dynamic capability also enhances institutional excellence by strengthening reputation and developing high-quality human resources. A strong national and international reputation helps attract prospective students, qualified faculty, and external funding, enabling private universities to build a distinctive and competitive position [44].

Some private universities face challenges in building entrepreneurial ecosystems due to limited entrepreneurial understanding and practical experience. Research remains focused on basic studies and academic publications, with limited social and economic impact. Interview findings revealed that low motivation and self-confidence among academics, despite existing incentives, hinder research development and commercialization. Limited entrepreneurial experience among faculty and staff also constrains the implementation of entrepreneurship programs. Therefore, entrepreneurship training is essential to strengthen their competencies, motivation, and organizational performance. Higher education institutions should adopt a comprehensive human resource strategy to support transformation toward an entrepreneurial university. Strategic human resource management, supported by relevant training, should develop entrepreneurial competencies, particularly teamwork, opportunity recognition, and self-efficacy [54].

Universities should also provide practical training on patents, commercialization, and industry-oriented proposal development while strengthening collaboration with industry and international researchers to accelerate technology transfer [17, 25]. Continuous professional development, institutional commitment, and selective recruitment are equally important to support innovation and organizational capacity [24, 32]. The Indonesian government has introduced several initiatives to strengthen entrepreneurship and innovation in higher education through the Ministry of Higher Education, Science, and Technology. Programs such as P2MW, Research and Community Service, Early-Career Lecturer Research Grants, Research Commercialization and Prototype Funding, Matching Fund Kedaireka, PTTI, and the Collaborative Digital Learning Grant support entrepreneurship, innovation, research commercialization, and cross-sector collaboration, contributing to sustainable national development.

These policies support SDG 4, SDG 8, and SDG 9 by strengthening innovation ecosystems and con-

necting research with industry. However, many private universities still face barriers, including limited funding, inadequate infrastructure, insufficient guidance, and complex administrative procedures. Expanding funding opportunities, simplifying administrative processes, and strengthening collaboration among universities, industry, and research institutions will create a more inclusive entrepreneurial ecosystem and enhance research commercialization. These initiatives are reinforced by the Ministry of Higher Education, Science, and Technology Regulation No. 39 of 2025 on Higher Education Quality Assurance, which promotes digital transformation in academic administration, curriculum management, quality assurance, and learning evaluation. Digitalization strengthens entrepreneurial ecosystems by improving digital competencies, supporting adaptive learning, facilitating national and international collaboration, and accelerating entrepreneurship and research commercialization in line with global and industry needs.

5. MANAGERIAL IMPLICATION

The findings suggest that private universities should prioritize strategic initiatives according to their relative importance to accelerate the transformation toward entrepreneurial universities. Since human resource development emerged as the highest-priority strategy, university leaders should first strengthen faculty and staff entrepreneurial competencies through continuous training, industry engagement, incentive systems, and leadership development. This should be complemented by strengthening collaboration with industry and government, embedding entrepreneurship into curricula, and promoting innovation-driven research commercialization to improve graduate quality, institutional competitiveness, and financial sustainability.

The results also indicate that entrepreneurial transformation cannot be achieved by universities alone. Given the complementary roles of government, industry, start-ups, financial institutions, and communities, university management should establish long-term partnerships to expand research funding, technology transfer, business incubation, and experiential learning opportunities. At the policy level, governments should complement financial support with simplified commercialization mechanisms, stronger university–industry collaboration, and digital transformation initiatives to foster a sustainable entrepreneurial ecosystem for private universities.

6. CONCLUSION

This study develops a Fuzzy Analytic Hierarchy Process (FAHP)-based framework to support the transformation of private universities into entrepreneurial universities. The findings identify leadership and governance as the most influential enabling factor, followed by funding and financial resources, entrepreneurial culture, human resources, and infrastructure and technology. Universities emerge as the most important actor in driving transformation, while improving graduate quality is the highest-priority objective. Among the proposed strategies, strengthening human resources ranks first, followed by collaboration, entrepreneurship-oriented curriculum development, innovation-based research commercialization, supportive internal policies, infrastructure and digitalization, and national and international partnerships. These findings demonstrate that successful entrepreneurial transformation requires coordinated internal capabilities and sustained collaboration with external stakeholders to enhance institutional sustainability and societal impact.

This study contributes to the entrepreneurial university literature by proposing an integrated decision-making framework that combines critical success factors, key actors, strategic objectives, and alternative strategies within a single FAHP model. Unlike previous studies that primarily examine entrepreneurial universities from conceptual or empirical perspectives, this research provides a systematic prioritization mechanism to support strategic decision-making in private universities. The framework offers practical guidance for university leaders and policymakers in allocating resources and designing transformation strategies aligned with institutional sustainability and the SDGs, particularly SDG 4, 8, and 9.

This study has several limitations that provide opportunities for future research. The analysis focuses on private universities in Indonesia and relies on expert judgments collected through the FAHP approach, which may limit the generalizability of the findings. Future studies should validate the proposed framework using larger and more diverse samples, including public universities and stakeholders from industry, start-ups, financial institutions, and local communities. In addition, integrating FAHP with other multi-criteria decision-making or structural modeling approaches could provide deeper insights into entrepreneurial university transformation strategies.

7. DECLARATIONS

7.1. About Authors

Indah Kusuma Hayati (IK)  <https://orcid.org/0009-0000-7608-7323>

Muhammad Syamsul Maarif (MS)  <https://orcid.org/0000-0001-6628-5203>

Illah Sailah (IS)  <https://orcid.org/0000-0001-5021-4048>

Nimmi Zulbainarni (NZ)  <https://orcid.org/0009-0009-2044-6759>

7.2. Author Contributions

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

7.3. Data Availability Statement

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

7.4. Funding

Lembaga Pengelola Dana Pendidikan (LPDP) of the Ministry of Finance of the Republic of Indonesia fully supported and funded this paper

7.5. 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.

REFERENCES

- [1] N. M. Tri and L. Hoa, "Renovating higher education in vietnam: A case ho chi minh city," *Social science journal*, vol. 12, no. 2, 2022.
- [2] A. Hermawan, W. Sunaryo, and S. Hardhienata, "Optimal solution for ocb improvement through strengthening of servant leadership, creativity, and empowerment," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 5, no. 1Sp, pp. 11–21, 2023.
- [3] M. Guerrero and M. Menter, "Driving change in higher education: the role of dynamic capabilities in strengthening universities' third mission," *Small Business Economics*, vol. 63, no. 3, pp. 1321–1337, 2024.
- [4] J. Morawska-Jancelewicz, "The role of universities in social innovation within quadruple/quintuple helix model: Practical implications from polish experience," *Journal of the Knowledge Economy*, vol. 13, no. 3, pp. 2230–2271, 2022.
- [5] N. J. Ogunode, C. U. Ukozor, and O. J. Abiodun, "Private universities in nigeria: Contributions, problems and way forward," *International Journal of Education and Life Sciences*, vol. 2, no. 5, pp. 436–451, 2024.
- [6] E. KarwowsKa, "How do responsible universities perceive their social engagement? in search of signs of creating shared value by the university," *Journal of Modern Science*, vol. 53, no. 4, pp. 451–465, 2023.
- [7] M. P. Salsabilla and L. L. Ulya, "How does intolerance of uncertainty predict work readiness? unveiling the role of self-efficacy," *Journal of Educational, Health & Community Psychology (JEHCP)*, vol. 14, no. 2, p. 808, 2025.
- [8] S. C. Pulino, "Embedding the entrepreneurial mindset at a liberal arts university," *Journal of the International Council for Small Business*, vol. 3, no. 1, pp. 62–67, 2022.
- [9] A. Liening, *Complexity and Entrepreneurship*. Springer, 2024.
- [10] O. C. d. R. Ribeiro, E. M. d. Silva, N. T. Tessaro, and N. P. Castanheira, "International scientific production on intrapreneurship: an analysis of research, frontiers and trends," *Gestão & Produção*, vol. 32, p. e12022, 2025.
- [11] H. Priyadi and A. S. Mulyani, "The concept of entrepreneurship in a business perspective," *Indonesian Journal of Applied and Industrial Sciences (ESA)*, vol. 3, no. 1, pp. 119–128, 2024.
- [12] H. Etzkowitz, "Entrepreneurial university icon: Stanford and silicon valley as innovation and natural ecosystem," *Industry and Higher Education*, vol. 36, no. 4, pp. 361–380, 2022.

- [13] S. Kosasi, U. Rahardja, I. D. A. E. Yuliani, R. Laipaka, B. Susilo, and H. Kikin, "It governance: Performance assessment of maturity levels of rural banking industry," in *2022 4th International Conference on Cybernetics and Intelligent System (ICORIS)*. IEEE, 2022, pp. 1–6.
- [14] P. A. Oganda and R. F. Terizla, "Strategic management practices in dynamic business environments," *APTISI Transactions on Management*, vol. 8, no. 1, pp. 24–31, 2024.
- [15] F.-S. Tripa, D. Badulescu, A. Badulescu, and S.-A. Bodog, "Shaping higher education: The rise of entrepreneurial universities," *Business Excellence & Management*, vol. 15, no. 1, 2025.
- [16] P. Effendi, "Ilomata international journal of management," *Management*, vol. 5, no. 3, pp. 823–844, 2024.
- [17] K. K. Rådberg and H. Löfsten, "The entrepreneurial university and development of large-scale research infrastructure: Exploring the emerging university function of collaboration and leadership," *The Journal of Technology Transfer*, vol. 49, no. 1, pp. 334–366, 2024.
- [18] N. H. Farhansyah and H. Fabroyir, "Entrepreneurial applications of augmented reality in product placement on shelves," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 8, no. 1, pp. 185–198, 2026.
- [19] H. Etzkowitz, J. Dzisah, and M. Clouser, "Shaping the entrepreneurial university: Two experiments and a proposal for innovation in higher education," *Industry and Higher Education*, vol. 36, no. 1, pp. 3–12, 2022.
- [20] L. Meria, M. S. Gunawan, S. Solahudin, U. Rahardja, and A. Patel, "Enhancing digital business students competence through ui/ux design training for digital product development," *ADI Pengabdian Kepada Masyarakat*, vol. 6, no. 2, pp. 133–144, 2026.
- [21] H. E. Riwayati, H. A. Rachman, S. Pramesworo, N. Yustisia, H. Umar, and M. Siahaan, "Unveiling the dynamics of financial literacy and inclusion in women digital loan decision making," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 7, no. 3, pp. 986–998, 2025.
- [22] J. van der Merwe, S. M. Wahid, G. P. Cesna, D. A. Prabowo *et al.*, "Improving natural resource management through ai: Quantitative analysis using smartpls," *International Transactions on Artificial Intelligence*, vol. 2, no. 2, pp. 135–142, 2024.
- [23] F. Sutisna, N. Lutfiani, E. Anderson, D. Danang, and M. O. Syaidina, "E-commerce and digital marketing strategies: Their impact on startupreneur performance using pls-sem," *IAIC Transactions on Sustainable Digital Innovation (ITSIDI)*, vol. 6, no. 2, pp. 215–223, 2025.
- [24] O. A. D. Wulandari, D. Apriani *et al.*, "Sustainable institutional entrepreneurial culture and innovation for economic growth," *APTISI Transactions on Management*, vol. 7, no. 3, pp. 221–230, 2023.
- [25] L. K. Choi, K. B. Rii, and H. W. Park, "K-means and j48 algorithms to categorize student research abstracts," *International Journal of Cyber and IT Service Management*, vol. 3, no. 1, pp. 61–64, 2023.
- [26] F. C. Ogbu, "Leadership and corporate governance," *Available at SSRN*, 2023.
- [27] B. Jongbloed and A. Kottmann, "Supporting entrepreneurial change processes in higher education: Lessons from heinnovate and beyondscale," *Center for Higher Education Policy Studies (CHEPS)*, 2022.
- [28] M. M. Sari, U. Rahardja, N. Azizah, G. Fransiso, and J. Bagaskara, "Analysis of academic information system integration in improving the quality of higher education data reporting to pddikti," *International Transactions on Education Technology (ITEE)*, vol. 4, no. 2, pp. 172–186, 2026.
- [29] S. A. Al-Maadeed and A. J. Yesuf, "Exploring financing mechanisms for entrepreneurial universities: a systematic review of current practices and future trends," *Kutahya Universitepark Ark. San*, 2025.
- [30] A. Awad, "The role of universities' social responsibility in enhancing business sustainability: Mediating role of entrepreneurial culture," *Problems and Perspectives in Management*, vol. 23, no. 1, p. 181, 2025.
- [31] J. A. López-Lemus, "Does human resource performance contribute to the success of the university entrepreneurial project?" *Entrepreneurial Business and Economics Review*, vol. 11, no. 2, pp. 137–155, 2023.
- [32] A. S. Bist, B. Rawat, U. Rahardja, M. Hardini, and M. Kamal, "Unveiling ethical challenges and malpractice in academic research and integrity," in *2024 3rd International Conference on Creative Communication and Innovative Technology (ICCIT)*. IEEE, 2024, pp. 1–6.
- [33] K. Azmi and R. Azmi, "Exploring the relationship between infrastructure and entrepreneurial development in brics countries "pmgardl" approach," in *E3S Web of Conferences*, vol. 418. EDP Sciences, 2023, p. 04001.
- [34] M. D. Firiza, N. Lutfiani, A. R. A. Zahra, U. Rahardja *et al.*, "The role of regtech in automating compliance and risk management," in *2024 12th International Conference on Cyber and IT Service Management (CITSM)*. IEEE, 2024, pp. 1–6.

- [35] L. Pittaway, P. Benedict, Z. Bedő, K. Erdős, and E. Flournoy, "Exploring venture funding in the entrepreneurial university," in *Strategies for the Creation and Maintenance of Entrepreneurial Universities*. IGI Global Scientific Publishing, 2022, pp. 194–221.
- [36] Z. Zhu, S. Cui, and Y. Wang, "Exploration on the collaborative relationship between government, industry, and university from the perspective of collaborative innovation," *Applied Mathematics and Nonlinear Sciences*, vol. 7, no. 2, pp. 903–912, 2022.
- [37] J. Gu, "Commercialization of academic patents in chinese universities: Antecedents and spatial spillovers," *Heliyon*, vol. 9, no. 3, 2023.
- [38] S. Haji Shahlehi, S. F. Haji Shahlehi, and V. N. Shaya, "The potentials of university–industry collaboration (uic) for agriculture from diverse stakeholders' perspectives," *Higher Education, Skills and Work-Based Learning*, vol. 15, no. 3, pp. 467–482, 2025.
- [39] M. A. Daniri, S. Wahyudi, and I. R. D. Pangestuti, "The role of good university governance for transformation towards the entrepreneurial university," *Corporate and Business Strategy Review*, vol. 4, no. 1, pp. 167–181, 2023.
- [40] Y.-K. Liao and R. R. M. Suprpto, "An empirical model of university competitiveness and rankings: The effects of entrepreneurial behaviors and dynamic capabilities," *Asia pacific management review*, vol. 29, no. 1, pp. 34–43, 2024.
- [41] E. E. Lehmann, J. M. Otto, and K. Wirsching, "Entrepreneurial universities and the third mission paradigm shift from economic performance to impact entrepreneurship: Germany's exist program and esg orientation," *The Journal of Technology Transfer*, vol. 49, no. 6, pp. 2184–2199, 2024.
- [42] P. Marchant-Pérez and J. J. Ferreira, "Integrating historical approaches of university ecosystems: reviewing the literature streams and future directions," *Management Review Quarterly*, vol. 75, no. 4, pp. 3555–3614, 2025.
- [43] A. Valencia, M. Drinkwater, and P. Deane, "The future of higher education in latin america and the caribbean: A foresight reflection," in *The Bloomsbury handbook of context and transformative leadership in higher education*. Bloomsbury Academic, 2024, pp. 302–332.
- [44] G. R. Brás, M. Torres Preto, A. D. Daniel, and A. A. Teixeira, "Assessing the impact of universities' entrepreneurial activity on regional competitiveness," *Administrative Sciences*, vol. 13, no. 2, p. 34, 2023.
- [45] S. W. F. binti Ambo'Miri, B. W. Kusuma, and A. N. Halimah, "Web-based information systems and knowledge management's impact on worker performance," *International Transactions on Education Technology*, vol. 2, no. 1, pp. 11–17, 2023.
- [46] L. N. Letsebe, P. E. Ebewo, and A. E. Nesamvuni, "Critical success factors in creating entrepreneurial universities: A case of botswana," *International Journal of Research in Business & Social Science*, vol. 13, no. 5, p. 830, 2024.
- [47] C.-C. Patriche and S.-F. RATĂ, "The impact of entrepreneurial activities in universities on their reputation," *Business Excellence & Management*, vol. 14, no. 4, 2024.
- [48] G. A. Pangilinan, S. Audiah, M. R. Shauqy, and O. F. P. Wahyudi, "Entrepreneurial marketing mindset as a determining factor for digital startup success," *Startupreneur Business Digital (SABDA Journal)*, vol. 4, no. 1, pp. 34–46, 2025.
- [49] L. D. Patrício and J. J. Ferreira, "Unlocking the connection between education, entrepreneurial mindset, and social values in entrepreneurial activity development," *Review of Managerial Science*, vol. 18, no. 4, pp. 991–1013, 2024.
- [50] P.-o. Wesarat, P. Benrit, W. Panrod, K. Tongsamsi, N. Useng, R. Kaewsaeng-on, and D. Tansui, "Identifying students' entrepreneurial mindset for the bachelor of business administration program, faculty of humanities and social sciences, prince of songkla university," *KnE Social Sciences*, pp. 1–11, 2022.
- [51] A. Civera and M. Meoli, "Corporate entrepreneurship strategy in universities: Emerging leadership in austerity time," *The Journal of Technology Transfer*, vol. 49, no. 6, pp. 2080–2103, 2024.
- [52] C. G. Iwu, E. T. Maziriri, L. Sibanda, and T. Makwara, "Unpacking the entrepreneurship education conundrum: Lecturer competency, curriculum, and pedagogy," *Administrative Sciences*, vol. 15, no. 1, p. 2.
- [53] N. Evans, A. Miklosik, and J. T. Du, "University-industry collaboration as a driver of digital transformation: Types, benefits and enablers," *Heliyon*, vol. 9, no. 10, 2023.
- [54] W. Fei and X. Shuangyan, "Structural model and characteristics of entrepreneurial opportunity recognition abilities among university students in china: a grounded theory approach," *Humanities and Social Sciences Communications*, vol. 11, no. 1, pp. 1–11, 2024.