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Accelerating University-Born Innovations Assessing the Role of Incubators in Technology Transfer and Commercialization in Universitas Pandanaran

Reuben Noviano C^{1,*}, Shoofi Maudya A¹, Sinta Petri Lestari^{1*}, Raihan Ikhsan A¹,
Akhmad Rifa'i A¹

¹Universitas Pandanaran

*Correspondence: sintapetri@unpand.ac.id

Abstract: The transition toward the "Entrepreneurial University" paradigm requires higher education institutions to actively translate academic research into market-ready innovations. This study assesses the operational efficacy and strategic role of the university business incubator at Universitas Pandanaran (UNPAND) Semarang in facilitating technology transfer and commercializing university-born innovations, particularly within its undergraduate Entrepreneurship study program. Employing a sequential explanatory mixed-methods design, quantitative data were gathered from a purposive sample of 45 student and faculty tenants using structured questionnaires, followed by qualitative semi-structured interviews with the incubator manager, faculty mentors, and student founders. The quantitative descriptive analysis reveals that while the incubator excels significantly in its early-stage pedagogy and business development services, a critical systemic gap exists in late-stage commercialization execution, specifically regarding Networking and Capital Access and advanced Technology Transfer/IP Support. Qualitative thematic analysis confirms that university-born innovations frequently experience the academic "Valley of Death," remaining stalled at lower Technology Readiness Levels (TRL 4 to 6) due to resource constraints typical of regional private universities and the lack of a dedicated Technology Transfer Office (TTO). Furthermore, Triple Helix interactions within the local Semarang ecosystem remain transactional rather than symbiotic. The study concludes that to successfully accelerate university innovations, the incubator must shift from an academic supply-push mechanism to an industry-driven demand-pull approach. Recommendations include establishing a dedicated technical IP liaison, institutionalizing long-term partnerships with regional industry bodies like KADIN Jateng, and launching an internal pre-seed catalyst fund to bridge student prototypes into sustainable corporate entities.

Keywords: University Business Incubator; Technology Transfer; Commercialization; University-Born Innovations; Entrepreneurial University; Triple Helix.



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A. Introduction

In the modern knowledge-based economy, the role of higher education institutions has undergone a fundamental paradigm shift. Universities are no longer merely repositories of knowledge or centers for traditional teaching and basic research. Instead, they have evolved into dynamic engines of economic growth and societal transformation, a phenomenon widely conceptualized as the "Entrepreneurial University." This transformation is heavily anchored in the Triple Helix model, which posits that innovation emerges from the spiral pattern of linkages between universities, industry, and government. Within this framework, universities are increasingly pressured to translate their academic research into tangible, market-ready innovations that can solve real-world problems, create jobs, and stimulate regional development. Central to this entrepreneurial evolution is the process of technology transfer and commercialization.

University-born innovations—ranging from advanced engineering prototypes to digital software solutions—hold immense potential. However, the journey of an innovation from a university laboratory or a student brainstorming session to the commercial marketplace is fraught with systemic barriers. Academic researchers and students often lack the commercial acumen, financial resources, market networks, and intellectual property expertise required to navigate the complex landscape of business commercialization. Consequently, a significant majority of university innovations suffer from the "Valley of Death" phenomenon, where promising technologies stall in the transition phase between initial research and viable commercial application.

The Crucial Role of University Business Incubators (UBIs)

To bridge this critical gap, University Business Incubators (UBIs) have emerged as vital institutional mechanisms. UBIs are specifically designed to accelerate the growth and success of entrepreneurial ventures by providing an interconnected ecosystem of support. This support typically encompasses physical infrastructure (coworking spaces and

laboratories), business development mentoring, access to seed capital and venture networks, intellectual property (IP) management, and strategic networking opportunities.

In the context of technology transfer, UBIs act as the primary catalysts for commercialization. They serve as the operational bridge that converts academic knowledge into commercial value. The efficacy of an incubator is not merely measured by the number of startups it houses, but by its systemic ability to accelerate technology readiness levels (TRLs), secure patents, facilitate licensing agreements, and foster scalable spin-offs. For student entrepreneurs, particularly those enrolled in dedicated Entrepreneurship study programs, the incubator functions as a living laboratory where theoretical business models are rigorously tested against market realities.

However, despite the widespread establishment of UBIs globally, their operational efficiency and strategic impact vary significantly. Literature suggests that the success of technology commercialization through UBIs depends heavily on institutional capacity, the alignment of stakeholder incentives, and the specific socioeconomic context of the surrounding region. Therefore, evaluating how incubators systematically assess, support, and accelerate university-born innovations remains a critical area of empirical inquiry.

The Indonesian Context and Higher Education Mandates

In Indonesia, the push toward university-led innovation and entrepreneurship has been heavily institutionalized through government mandates. The Ministry of Education, Culture, Research, and Technology has aggressively promoted the Kampus Merdeka (Independent Campus) policy, which explicitly encourages experiential learning, student entrepreneurship, and independent projects. Furthermore, the government recognizes that Indonesia's transition toward a high-income economy depends on shifting from a resource-based economy to an innovation-driven economy.

Despite these grand policy designs, Indonesian higher education institutions face distinct structural challenges in technology transfer.

Many universities still struggle with low patent commercialization rates, a lack of professional Technology Transfer Offices (TTOs), and a historical disconnect between academic research agendas and actual industry demands. While top-tier national universities in major metropolitan hubs have established relatively mature incubation ecosystems, private and regional universities often operate under tighter resource constraints and face different market dynamics.

Institutional Context: Universitas Pandanaran Semarang

Universitas Pandanaran (UNPAND) in Semarang, Central Java, represents a critical case study within this institutional landscape. As a prominent higher education institution in Central Java, UNPAND has committed to fostering an entrepreneurial mindset among its students, notably supported by its specialized Entrepreneurship study program. The university recognizes that Semarang, as a burgeoning industrial and commercial hub, provides a fertile ground for student-led startups and technological innovations.

To actualize this vision, Universitas Pandanaran has integrated business incubation mechanisms to support university-born innovations. Students are encouraged to develop innovative business concepts, leveraging technological advancements to solve local and national challenges. However, the operational trajectory of converting these student innovations into commercialized products or sustainable corporate entities faces localized hurdles. These include managing the balance between academic requirements and business development, securing sustainable funding pathways, establishing strong industry partnerships within the Central Java region, and optimizing the incubator's internal mentoring and technology transfer protocols.

Given this context, there is an urgent empirical need to assess the specific role, efficacy, and strategic impact of the incubator at Universitas Pandanaran. How effectively does it accelerate university-born innovations? What are the structural bottlenecks in its technology transfer and commercialization processes? Addressing

these questions is paramount to optimizing the university's entrepreneurial ecosystem.

Research Gap and Significance

While extensive literature exists on the performance of university incubators in developed nations or within elite tech-focused institutes, there is a noticeable research gap regarding the performance of UBIs in private and regionally focused universities in developing economies like Indonesia. Most existing studies focus heavily on faculty-led high-tech spin-offs, largely overlooking student-led, university-born innovations within dedicated undergraduate Entrepreneurship programs.

This study aims to fill this gap by evaluating the role of the incubator at Universitas Pandanaran Semarang in facilitating technology transfer and commercialization. By focusing on "university-born innovations"—which encompass both student and faculty collaborative projects—this research evaluates the entire incubation pipeline from ideation to market entry.

The significance of this study is threefold:

Theoretical Contribution: It extends the application of the Entrepreneurial University and Triple Helix frameworks to regional private higher education settings in Southeast Asia.

Practical Significance for UNPAND: It provides actionable, data-driven insights for the management of Universitas Pandanaran to refine their incubator services, optimize resource allocation, and enhance policy frameworks supporting student intellectual property and commercialization.

Policy Relevance: It offers a benchmark for regional policymakers and chamber of commerce stakeholders in Semarang on how to better integrate regional industry with university innovation ecosystems.

B. Literature Review

1. The Paradigm of the Entrepreneurial University

The concept of the higher education institution has significantly evolved past its traditional boundaries of teaching (the first mission) and basic research (the second mission). In the modern knowledge-based economy, universities are increasingly embracing their "third mission": direct engagement with socio-economic

development and market creation (Guerrero et al., 2016). This institutional evolution is conceptualized as the "Entrepreneurial University" paradigm (Rothaermel et al., 2007). According to Shane (2004), an entrepreneurial university is characterized by its capacity to generate organizational spin-offs, patent academic discoveries, and foster an internal ecosystem where students and faculty view knowledge not merely as an intellectual asset, but as a commercial commodity. In developing economies, this paradigm shift is often heavily incentivized by government mandates to stimulate regional economic growth and reduce reliance on resource-based economies. However, transforming a traditional academic culture into an opportunistic, market-driven environment requires robust support structures that can align academic discovery with market demand.

2. The Triple Helix Model and Regional Innovation Ecosystems

To understand how university-born innovations successfully reach the market, literature heavily relies on the Triple Helix model developed by Etzkowitz and Leydesdorff (2000). This model posits that economic development in the knowledge economy is driven by the continuous, spiral interactions among three distinct institutional spheres:

Academia (Universities): Acting as the primary source of new knowledge, human capital, and raw technological innovations.

Industry (Business Sector): Acting as the commercial vehicle that possesses market access, manufacturing capabilities, and capital.

Government: Acting as the regulatory architect that provides public funding, tax incentives, and protective legal frameworks (e.g., intellectual property laws).

The core tenet of the Triple Helix framework is that as these three spheres interact, their boundaries overlap, creating hybrid institutional blocks such as technology transfer offices and science parks. Within regional innovation ecosystems—such as Central Java—the strength of these overlapping interactions determines the commercialization success rate. When a regional university operates in isolation from local manufacturing and business networks, the flow

of innovation stagnates, leading to sub-optimal economic outcomes (Perkmann et al., 2013).

3. University Business Incubators (UBIs) as Technology Transfer Catalysts

Within the entrepreneurial university framework, University Business Incubators (UBIs) serve as the operational bridge executing the commercialization of knowledge. Unlike independent commercial accelerators, UBIs are distinct because they must balance academic/pedagogical mandates with commercial realities (Mian et al., 2016).

According to Bergek and Norrman (2008), the value-added configuration of a UBI can be evaluated through three core operational pillars: **Selection:** The criteria and mechanisms used to identify high-potential innovations from student or faculty portfolios.

Business Support (Incubation): The provision of hard infrastructure (coworking spaces, labs) combined with soft infrastructure (mentoring, business model validation, accounting training).

Mediation (Networking): The incubator's capability to act as a boundary-spanner, linking internal university tenants with external actors such as venture capitalists, corporate buyers, and intellectual property attorneys.

In specialized undergraduate Entrepreneurship study programs, UBIs act as an essential pedagogical extension. They provide a safe "living laboratory" where students can test theoretical frameworks against real consumer behavior without immediately facing catastrophic financial risks (Phan et al., 2005).

4. Technology Transfer, Commercialization, and the "Valley of Death"

Technology transfer in higher education refers to the formalized process of shifting university-generated knowledge, patents, and prototypes into the broader commercial market (Markman et al., 2008). This process is systematically measured using the Technology Readiness Level (TRL) scale, which ranges from TRL 1 (basic principles observed) to TRL 9 (actual system proven in an operational environment).

The primary obstacle in this pipeline is the "Valley of Death"—a metaphorical concept describing the critical gap between academic

prototyping (typically TRL 4 or 5) and commercial viability (TRL 7 or above).

In this zone, innovations frequently collapse because they lack the necessary capital, professional management, and industrial scaling capabilities to bridge the gap. Grimaldi and Grandi (2005) observe that university innovations are uniquely vulnerable to this phase because academic inventors often suffer from "technological optimism," focusing excessively on product features while ignoring market size, regulatory hurdles, and distribution logistics. Therefore, the strategic intervention of a UBI during this specific transition phase is paramount to accelerating technology transfer.

5. Incubation Challenges in Private and Regional Higher Education

The vast majority of baseline literature on UBIs focuses on elite, heavily funded public institutions or technological universities in developed economies. However, research indicates that regional private universities in developing nations face vastly different structural realities (Guerrero & Urbano, 2012). Private regional universities often operate under tight resource constraints, lacking massive state-backed research grants and specialized, professional Technology Transfer Offices (TTOs). Consequently, their incubators are frequently managed by faculty members who must balance heavy teaching loads with complex business incubation duties. Furthermore, the local regional ecosystem may lack highly concentrated venture capital clusters, forcing the incubator to rely on local micro-enterprises and small-to-medium business associations (MSMEs) for networking. Understanding how UBIs successfully navigate these localized resource constraints while managing student-born innovations represents a critical, evolving frontier in entrepreneurship education literature.

C. Methods

1. Research Design

This study employs a sequential explanatory mixed-methods design to comprehensively assess the role of the university business incubator at Universitas Pandanaran (UNPAND) Semarang. A mixed-methods approach is highly suitable for evaluation studies in

entrepreneurship education and technology transfer, as it allows researchers to not only quantify operational performance metrics but also qualitatively explore the underlying institutional dynamics, challenges, and systemic bottlenecks.

In the first phase, quantitative data was gathered to map the baseline efficiency, output metrics, and satisfaction levels of student entrepreneurs regarding incubator services. In the second phase, qualitative inquiries were conducted through semi-structured interviews to provide a deeper context to the quantitative findings, creating a robust, triangulated framework of analysis.

2. Research Context and Informants/Respondents

The research was conducted at Universitas Pandanaran, Semarang, focusing specifically on the university's internal business incubator ecosystem and its intersection with the undergraduate Entrepreneurship study program. The target population and sample for this study were categorized into two distinct groups to ensure a comprehensive multi-stakeholder perspective:

Quantitative Sample

A purposive sampling technique was applied to select respondents for the quantitative survey. The criteria for selection included:

1. Active undergraduate students from the Entrepreneurship study program who have developed a business prototype or startup concept.
2. Student tenants currently or previously registered under the UNPAND business incubator program.
3. Faculty members or researchers who have collaborative technology transfer projects managed by the incubator.

A total of 45 respondents successfully completed the structured questionnaire, representing the active entrepreneurial core of the university.

Qualitative Informants

To gain deep institutional insights, informants for the qualitative phase were selected using theoretical sampling. The informants included:

1. The Director/Manager of the Universitas Pandanaran Business Incubator (\$N = 1\$).

2. Faculty mentors/business coaches assigned to student startups (\$N = 3\$).
3. Student startup founders who have reached the commercialization or commercial launch stage (\$N = 3\$).

3. Data Collection Methods and Instruments

Data collection was structured into two primary mechanisms, corresponding to the mixed-methods framework:

Quantitative Instruments (Survey Questionnaire)
The quantitative instrument consisted of a closed-ended questionnaire measured on a 5-point Likert Scale (ranging from 1 = Strongly Disagree to 5 = Strongly Agree). The questionnaire was divided into specific dimensions adapted from the University Business Incubator evaluation framework by Mian (1996) and Bergek & Norrman (2008):

1. Infrastructure Support: Adequacy of coworking spaces, labs, and administrative facilities.
2. Business Development Services: Quality of mentoring, financial literacy training, and marketing assistance.
3. Networking and Capital Access: Facilitation of connections with local industries, venture capital, and government grants.
4. Technology Transfer and IP Support: Assistance in managing intellectual property rights (HKI/Patents) and navigating licensing.

Qualitative Instruments (Semi-Structured Interviews)

Semi-structured interview protocols were designed to elicit detailed narratives regarding the operational challenges of the incubator. Key inquiry areas included the alignment between the Entrepreneurship curriculum and incubator programs, regional industry engagement hurdles in Semarang, and the regulatory challenges of transferring technology from an academic setting to the open market. All interviews were audio-recorded with the consent of the participants and transcribed verbatim for analysis.

4. Operationalization of Variables / Analytical Focus

To systematically assess the role of the incubator, the study operationalizes the primary construct, Incubator Efficacy in Technology Transfer and

Commercialization (\$Y\$), through four distinct operational dimensions, outlined in the table below:

Dimension	Core Indicators	Measurement Mode
Input Metrics	Availability of operational budget; Mentor-to-tenant ratio; Infrastructure quality.	Quantitative (Descriptive)
Process Metrics	Frequency of mentoring sessions; Effectiveness of business matchmaking; IP counseling access.	Quantitative (Perception) & Qualitative
Output Metrics (TRL)	Advancement in Technology Readiness Levels (TRLs) from ideation to functional prototype.	Quantitative (Frequencies)
Commercialization Outcomes	Number of legal entities formed (CV/PT); Number of registered Intellectual Properties (HKI); Product sales volume.	Mixed Methods

5. Data Analysis Techniques

The collected data went through parallel analysis streams to ensure empirical rigor:

Quantitative Analysis

Quantitative data from the surveys were analyzed using Descriptive Statistical Analysis and Gap Analysis. Frequency distributions, mean scores, and standard deviations were calculated using SPSS software to determine the perceived performance levels of each incubator dimension. A mean score threshold was established to identify which incubator services fell short of student expectations.

Qualitative Analysis

The qualitative interview transcripts were analyzed using Thematic Analysis following the framework by Braun & Clarke (2006). The analysis involved an iterative process of:

1. Familiarization with the data through repeated reading of transcripts.
2. Generating initial open codes for significant statements.
3. Searching and grouping codes into broader themes (e.g., "Resource Constraints," "Institutional Bureaucracy," "Market Realities").

4. Reviewing and refining themes against the quantitative data to form a cohesive explanatory narrative.
5. Research Materials and Technology Tracked
As this study evaluates Technology Transfer, specific focus was placed on tracking the material nature of the innovations born within the university. The study classified and tracked student and faculty innovations into three distinct material categories:
 1. Digital Innovations: Mobile applications, e-commerce platforms, and digital services developed by students.
 2. Processed Food & Agribusiness Technologies: Product innovations in food processing, packaging technologies, and local commodity value-adds, which are prevalent in the Semarang regional market.
 3. Creative and Applied Engineering: Practical hardware or manufacturing designs developed in collaboration with engineering and business student clusters.

The Technology Readiness Level (TRL) scale, adapted from the Indonesian Ministry of Research and Technology standards (Scale 1 to 9), was utilized as a benchmark tool within the questionnaires to assess how far these physical and digital materials progressed under the incubator's tenure.

D. Result and Discussion

1. Quantitative Results: Assessing Incubator Performance Dimensions

The quantitative phase of this research evaluated four core performance dimensions of the business incubator at Universitas Pandanaran (UNPAND) Semarang: Infrastructure Support, Business Development Services, Networking and Capital Access, and Technology Transfer/IP Support. The data collected from 45 entrepreneurship student and faculty tenants were analyzed using descriptive statistics. The summary of the mean scores (measured on a 1–5 Likert scale) is presented in the table below.

Table 1: Mean Performance Scores of Incubator Dimensions at UNPAND

Performance Dimension	Key Indicators Measured	Mean Score (μ)	Standard Deviation (σ)	Interpretation
Infrastructure Support	Coworking space, internet speed, utilities, office facilities.	3.84	0.65	Satisfactory
Business Development	Mentoring quality, business coaching, financial training.	4.12	0.52	High Performance
Networking & Capital Access	Industry matchmaking, angel investors, venture capital link.	2.95	0.88	Critical Gap
Technology Transfer & IP	Patent filing, copyright help, TRL advancement.	3.10	0.74	Moderate / Developing
Overall Framework Index		3.50	0.69	Moderate

The descriptive data indicates that the Business Development Services dimension achieved the highest score ($\mu = 4.12$). This reflects the strong pedagogical alignment between the incubator and the dedicated undergraduate Entrepreneurship study program, where faculty members actively engage as business coaches. Conversely, Networking and Capital Access scored the lowest ($\mu = 2.95$), pointing to a substantial systemic bottleneck in linking university-born innovations with institutional investors and regional markets in Central Java.

2. Qualitative Findings: Thematic Insights into the Commercialization Pipeline

Through thematic analysis of the semi-structured interviews conducted with the incubator manager, student founders, and mentors, three major qualitative themes emerged. These themes provide structural context to the quantitative gaps identified above.

Theme 1: Academic Pedagogy vs. Market Execution

Interviews revealed that while the incubator is highly effective at fostering the early ideation phase—heavily supported by the academic curriculum—there is a major friction point during market execution. Student tenants emphasized that transitioning from a graded classroom project to a registered corporate entity requires a shift in mindset that the university ecosystem is still adapting to support. One student founder noted:

"The mentoring we get for sharpening our business model is excellent. But when it comes to supply chain logistics and real-world commercial distribution in Semarang, we often have to figure it out ourselves by trial and error."

Theme 2: The Institutional Bottleneck in IP and Technology Transfer

The qualitative data highlighted that many university-born innovations remain stuck at lower Technology Readiness Levels (TRL 4 to 6), operating primarily as functional prototypes rather than market-ready commercial products. The lack of a fully dedicated, professional Technology Transfer Office (TTO) inside the university forces the incubator staff to handle complex intellectual property (HKI) filings alongside standard business mentoring. This dual responsibility dilutes the focus required to commercialize high-tech or creative engineering innovations effectively.

Theme 3: Regional Ecosystem Isolation

The incubator manager acknowledged that establishing structural, sustainable relationships with external venture capitalists or large industrial partners in Central Java remains a steep hurdle. Most partnerships are currently based on ad-hoc networking rather than institutionalized frameworks, which directly explains the low score ($\mu = 2.95$) in the Networking and Capital Access dimension.

3. Discussion: Contextualizing UNPAND within the Entrepreneurial University Paradigm

The Success of Internal Incubation Pedagogy

The high performance in business development and mentoring ($\mu = 4.12$) proves that Universitas Pandanaran has successfully

institutionalized the first phase of the Entrepreneurial University model. By structurally linking the Entrepreneurship study program with the incubator, the university ensures a steady pipeline of student-born innovations. This integration aligns with the findings of Guerrero et al. (2016), who argue that a strong internal entrepreneurial culture and curriculum are fundamental preconditions for successful university spin-offs. The incubator functions effectively as an experiential learning laboratory, successfully elevating student projects from conceptual designs to functional business prototypes.

The "Valley of Death" in Regional Technology Transfer

Despite the success in early-stage mentoring, the sharp drop-off in Networking/Capital Access and IP Support illustrates the classic "Valley of Death" in university technology transfer (Rothaermel et al., 2007). The data shows that UNPAND's incubator operates predominantly as a traditional business incubator rather than an advanced technology accelerator.

To successfully accelerate technology transfer ($\text{Academic} \setminus \text{Knowledge} \rightarrow \text{Commercial} \setminus \text{Value}$), an incubator must possess strong boundary-spanning capabilities to bridge academia and industry. At UNPAND, this bridge is constrained by resource limitations typical of regional private universities. While top-tier public universities receive heavy state subsidies to absorb the financial risks of technology commercialization, private institutions like UNPAND must rely on lean operational models. Consequently, innovations struggle to progress past TRL 6 due to a lack of industrial testing grounds and seed capital.

Optimizing the Triple Helix in Semarang's Industrial Landscape

The findings indicate a structural gap in the practical application of the Triple Helix model (Etzkowitz & Leydesdorff, 2000) within the local Semarang ecosystem. The interactions between the university (UNPAND), local industry (Semarang's industrial zones), and the regional government are currently transactional rather than symbiotic.

To resolve this, the incubator needs to shift its strategy from a supply-push model (incubating

whatever students invent) to a demand-pull model (aligning student innovations with the operational needs of Semarang's manufacturing, logistics, and creative sectors). For instance, digital innovations or processed food technologies developed by students should be co-developed with local industry associations (such as KADIN Jateng) from day one. This proactive alignment would significantly lower market entry barriers and improve the low commercialization rates observed in the quantitative analysis.

E. Conclusion and Recommendation

1. Conclusion

This study assessed the operational efficacy and strategic role of the university business incubator at Universitas Pandanaran (UNPAND) Semarang in accelerating technology transfer and commercializing university-born innovations. By integrating quantitative evaluations with qualitative multi-stakeholder narratives, several key conclusions can be drawn:

First, the incubator at Universitas Pandanaran excels in its pedagogical and early-stage business development capacities ($\mu = 4.12$). Due to its close integration with the undergraduate Entrepreneurship study program, the incubator operates effectively as an experiential learning laboratory, successfully helping student and faculty innovators develop viable business models and early-stage functional prototypes.

Second, a critical systemic bottleneck exists in the late-stage commercialization pipeline, specifically regarding Networking and Capital Access ($\mu = 2.95$) and advanced Technology Transfer/IP Support ($\mu = 3.10$). Innovations within the university frequently encounter the academic "Valley of Death," remaining stalled at lower Technology Readiness Levels (TRL 4 to 6). This is primarily due to resource constraints typical of regional private universities, the lack of a dedicated Technology Transfer Office (TTO), and the absence of institutionalized, long-term partnerships with external venture capital networks.

Third, the operationalization of the Triple Helix model within the UNPAND ecosystem is currently transactional rather than deeply integrated. To transform university-born innovations into sustainable corporate entities,

the incubator must shift from an academic supply-push mechanism to an industry-driven demand-pull approach that directly responds to Semarang's regional economic and manufacturing needs.

2. Recommendations

Based on the empirical findings and discussions, the following strategic actions are recommended to optimize the incubator ecosystem at Universitas Pandanaran Semarang:

- a. Establish a Dedicated Technology Transfer Liaison: UNPAND should separate academic mentoring from technical IP/licensing administration. Creating a specialized liaison role within the incubator will accelerate patent/HKI filings and help student startups protect their intellectual property early in the commercialization phase.
- b. Institutionalize Demand-Pull Industry Partnerships: The incubator management should shift from ad-hoc networking to formal, long-term joint ventures with regional industry associations in Central Java, such as KADIN Jateng and local Micro, Small, and Medium Enterprise (MSME) agencies. Student innovations should be co-designed from inception to solve specific operational challenges within local industries.
- c. Create an Internal "Pre-Seed" Catalyst Fund: To help promising student prototypes bridge the financial gap from TRL 6 (prototype) to TRL 8 (market testing), the university should establish a lean, performance-based internal micro-grant or pre-seed fund, while simultaneously building an angel investor network comprising successful UNPAND alumni.
- d. Curriculum Synchronization: Further refine the Entrepreneurship study program curriculum to include specialized modules on supply chain logistics, manufacturing scaling, and digital product life cycle management, ensuring student founders are academically equipped for actual market execution.

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