

Qualitative Exploration: The Role of Technopreneurship in Higher Education

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ABSTRACT: *The rapid advancement of the Fourth Industrial Revolution and digital transformation has positioned technopreneurship as a key driver of innovation and economic growth. As a fusion of technology and entrepreneurship, technopreneurship serves as a vehicle for creating economic value and providing solutions to complex social challenges. However, despite its importance, the implementation of technopreneurship in academic settings remains hindered by several barriers, including a lack of conceptual understanding, limited institutional support, and a misalignment of the curriculum with industry needs. Using a qualitative approach, this study explores the dynamics of technopreneurship adoption among the academic community at Ivet University, Semarang. Data were collected through structured in-depth interviews with lecturers, educational staff, and students, then analyzed thematically to identify key factors influencing its implementation. The findings indicate that the implementation of technopreneurship varies widely, with three main orientations emerging: academic, economic, and social. While some lecturers demonstrate high technopreneurial potential through innovative learning tools and technology-based teaching strategies, others remain focused on routine tasks without engaging in entrepreneurial initiatives. Furthermore, institutional support and personal motivation are crucial factors in encouraging technopreneurial activities in the campus ecosystem. This study contributes to the literature by providing an in-depth understanding of technopreneurship adoption in higher education, emphasizing the interaction between individual agency and institutional structures. The results provide practical insights for higher education institutions seeking to integrate technopreneurship into their academic framework through faculty development programs, technology incubators, and curriculum enhancements.*

Keywords: *higher education, innovation, institutional support, qualitative exploration, technopreneurship.*

ABSTRAK: Kemajuan pesat Revolusi Industri Keempat dan transformasi digital telah menempatkan teknopreneurship sebagai pendorong utama inovasi dan pertumbuhan ekonomi. Sebagai perpaduan antara teknologi dan kewirausahaan, teknopreneurship berfungsi sebagai sarana untuk menciptakan nilai ekonomi sekaligus memberikan solusi atas berbagai tantangan sosial yang kompleks. Namun demikian, meskipun memiliki peran penting, implementasi teknopreneurship di lingkungan akademik masih menghadapi berbagai hambatan, antara lain kurangnya pemahaman konseptual, terbatasnya dukungan institusional, serta ketidaksesuaian kurikulum dengan kebutuhan industri. Dengan menggunakan pendekatan kualitatif, penelitian ini mengeksplorasi dinamika adopsi teknopreneurship di kalangan sivitas akademika Universitas Ivet Semarang. Data dikumpulkan melalui wawancara mendalam terstruktur dengan dosen, tenaga kependidikan, dan mahasiswa, kemudian dianalisis secara tematik untuk mengidentifikasi faktor-faktor kunci yang memengaruhi implementasinya. Hasil penelitian menunjukkan bahwa implementasi teknopreneurship sangat bervariasi, dengan munculnya tiga orientasi utama, yaitu akademik, ekonomi, dan sosial. Sebagian dosen

menunjukkan potensi teknopreneurial yang tinggi melalui pengembangan perangkat pembelajaran inovatif dan strategi pengajaran berbasis teknologi, sementara sebagian lainnya masih berfokus pada tugas-tugas rutin tanpa keterlibatan dalam inisiatif kewirausahaan. Lebih lanjut, dukungan institusional dan motivasi personal terbukti menjadi faktor krusial dalam mendorong aktivitas teknopreneurship di dalam ekosistem kampus. Penelitian ini berkontribusi pada pengembangan literatur dengan memberikan pemahaman mendalam mengenai adopsi teknopreneurship di pendidikan tinggi, khususnya dengan menekankan interaksi antara agensi individu dan struktur institusional. Temuan ini juga memberikan wawasan praktis bagi perguruan tinggi yang ingin mengintegrasikan teknopreneurship ke dalam kerangka akademik melalui program pengembangan dosen, inkubator teknologi, serta penyempurnaan kurikulum..

Kata kunci: dukungan institusional, eksplorasi kualitatif, inovasi, pendidikan tinggi, teknopreneurship.

INTRODUCTION

The Fourth Industrial Revolution (Industry 4.0) has fundamentally transformed the global economic and educational landscape, positioning technopreneurship as a key driver of innovation and sustainable development. Technopreneurship, defined as the integration of technological innovation with entrepreneurial action, is increasingly recognized as a catalyst for economic growth, job creation, and social transformation (Yordanova et al., 2020). In the context of higher education, universities are expected to evolve beyond their traditional role as transmitters of knowledge, becoming centers of innovation that foster technology-based entrepreneurship and contribute to regional development (Wagner et al., 2021; Čajka et al., 2023).

In Indonesia, as in many developing countries, the integration of technopreneurship into higher education remains uneven. While some institutions have established incubators and innovation centers, many still face structural and cultural barriers, including limited funding, inadequate digital competency among faculty members, and policies that discourage entrepreneurial activity (Syed et al., 2023). This gap underscores the need for contextual research that explores how technopreneurship is adopted and sustained within the academic ecosystem.

This research addresses this gap by examining the dynamics of technopreneurship adoption at Ivet University, Semarang, focusing on three main research questions: 1) How is technopreneurship implemented among academic stakeholders?; 2) What factors support or hinder its implementation? 3) How does the interaction between individual agency and institutional structures shape technopreneurial outcomes?

By answering these questions, this research contributes to the academic study of entrepreneurship in higher education, while also providing practical insights for policymakers and university leaders seeking to build a sustainable technopreneurial ecosystem.

METHODS

This study employs a qualitative design to investigate the experiences, motivations, barriers, and perceptions of academic stakeholders regarding the adoption of technopreneurship. A qualitative approach was chosen because it enables in-depth exploration of contextual data that cannot be fully understood through quantitative methods (Moss et al., 2022; Badoiu et al., 2020).

Research Setting and Participants

The study was conducted at Ivet University, Semarang, Indonesia, a private university with a growing interest in digital innovation and entrepreneurship. Data were collected from 18 participants, selected through purposive sampling to ensure representation across three main groups: lecturers (n = 8), educational staff (n = 5), and students (n = 5). Participants were selected based on their involvement or exposure to technopreneurial activities.

Data collection

Data were collected through structured in-depth interviews, each lasting 45–60 minutes. Interviews were conducted in Indonesian, then transcribed and translated into English for analysis. The interview guide was developed based on the research questions and the TPB framework, covering topics such as: 1) Experience with technology-based innovation; 2) Perceptions of institutional support; 3) Barriers and drivers of technopreneurship; 4) Personal motivation and social influence. The research process and thematic analysis framework are presented in Figure 2.

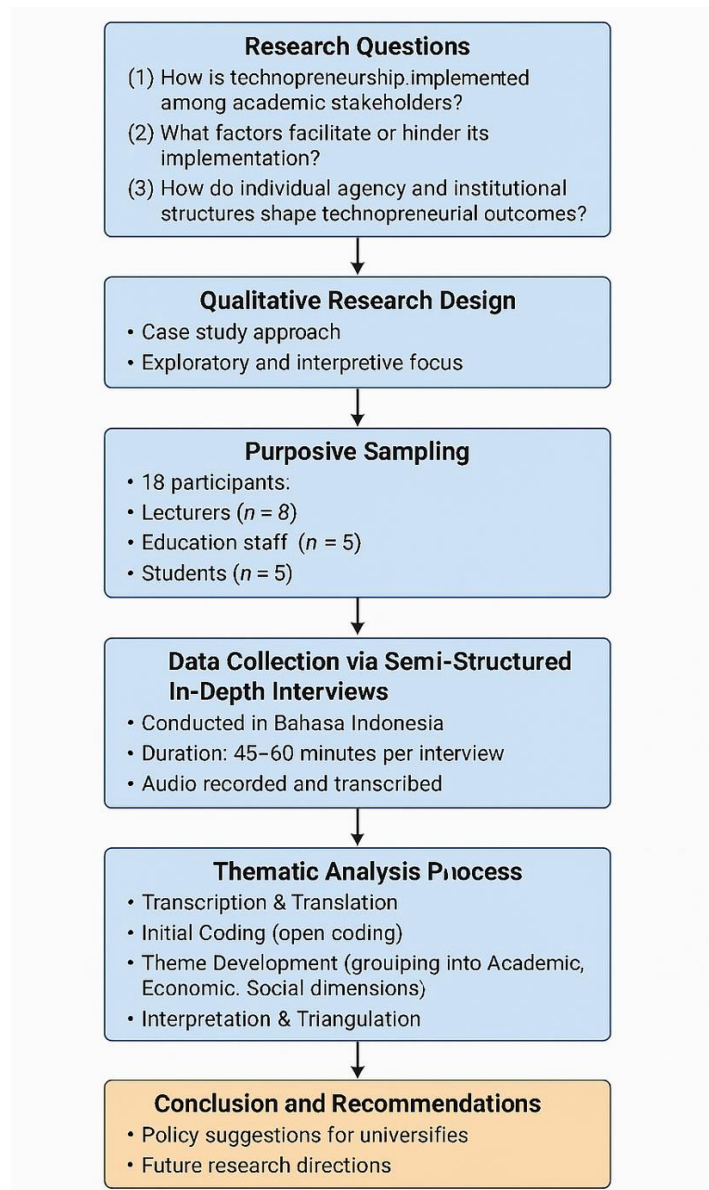


Figure 1. Research Process and Thematic Analysis Framework

Data analysis

Thematic analysis was used to identify, analyze, and report patterns in the data (Weckesser & Denny, 2022). The process included: 1) Transcribing all interview recordings; 2) Initial coding based on key concepts; 3) Grouping themes based on academic, economic, and social dimensions; 4) Interpreting the findings about the TPB and the research questions.

Data Validity

To ensure credibility, this study used: 1) Triangulation: Data from various stakeholder groups and documents; 2) Member checking: Participants reviewed transcripts and interpretations; 3) Audit trail: Complete documentation of the research process. Ethics approval was obtained from the institutional ethics committee, and written informed consent was obtained from all participants.

RESULTS AND DISCUSSION

Results

Three main dimensions of technopreneurship emerged from the data: academic, economic, and social.

1. Many lecturers demonstrate technopreneurial potential through the development of IoT-based learning media, interactive videos, and digital modules. These innovations increase student engagement and pedagogical effectiveness. However, these innovations are often used solely for teaching, with no attempt to commercialize or scale them.
2. Despite their technological competence, few participants developed patents, startups, or industry collaborations. Key barriers included a lack of funding, mentorship, and market access. As one lecturer put it: "I have an idea for a learning app, but I do not know how to protect it or find investors"
3. Technopreneurship is evident in mentoring outstanding students, community service projects, and active participation in professional organizations. Students involved in technology clubs report increased self-confidence and job readiness.

Barriers Include Limited institutional policies, a lack of incentives, bureaucratic processes, and low risk tolerance. Drivers: Personal motivation, access to digital tools, and informal peer networks.

Discussion

This qualitative research provides in-depth empirical insights into the dynamics of technopreneurship in the academic environment of Ivet University, Semarang. Based on three main research questions: (1) How is technopreneurship implemented among academic stakeholders? (2) What factors support or hinder its implementation? (3) How does the interaction between individual agency and institutional structures shape technopreneurial outcomes? The findings of this research not only reveal local realities but also provide conceptual contributions to understanding the technopreneurial ecosystem in Indonesian higher education. The following is an in-depth analysis that directly answers these three questions.

The implementation of technopreneurship at Ivet University is not homogeneous, but varies according to the roles and motivations of each stakeholder. Research findings reveal that technopreneurship is manifested in three main

dimensions: academic, economic, and social, reflecting a holistic approach to technology-based innovation.

First, in the academic dimension, technopreneurship is most often adopted through pedagogical innovations, such as the development of IoT-based learning media, interactive videos, digital modules, and technology-based learning strategies. This suggests that some lecturers have internalized a technopreneurial mindset not through commercialization, but by enhancing the quality of learning. This finding aligns with research by Basilotta-Gómez-Pablos et al. (2022), which emphasizes that lecturers' digital competence is the primary foundation for educational transformation in the digital era.

Second, in the economic dimension, the implementation of technopreneurship remains very limited. Although some lecturers and students have innovative ideas, only a few succeed in developing commercial products such as patents, startups, or industry collaborations. Most innovations remain at the prototype or class project stage, with no attempt to legally protect or market them. This suggests that technopreneurship here is more instrumentally academic than commercially entrepreneurial.

Third, in the social dimension, technopreneurship is evident in mentoring outstanding students, active participation in professional organizations, and direct contributions to society through technology-based solutions. This demonstrates that technopreneurship is not solely profit-oriented but also socially impactful, in line with the principles of sustainable development (Altantsetseg et al., 2020).

Thus, the implementation of technopreneurship among academic stakeholders remains predominantly academic and socially oriented, while the economic dimension has not been fully explored. This illustrates the gap between potential and realization; many technological innovations have been born but have not yet become sustainable value creation.

What factors support or hinder its implementation

Research findings reveal that the implementation of technopreneurship is influenced by a complex interaction between individual and structural factors, which can be explained through the Theory of Planned Behavior (TPB) (Aliedan et al., 2022).

1. **Supporting Factors:** Personal motivation is the primary driver. Some lecturers are motivated to innovate by a desire to improve the quality of learning, enhance their academic reputation, or achieve personal satisfaction. The technological competence of young lecturers is a crucial asset in fostering digital innovation. Informal networks between lecturers and students also serve as spaces for collaboration and the exchange of ideas, although they have not yet been institutionalized.
2. **Inhibiting Factors:** Lack of institutional support is a significant barrier. Many respondents stated that there are no explicit policies supporting technopreneurship, no incentives (in SKP or functional positions), and limited

access to research funding or business incubators. The traditional academic culture prioritizes scientific publication and teaching over technology-based innovation and entrepreneurship. This creates weak normative pressure (subjective norms) for technopreneurial behavior (Lyken-Segosebe et al., 2020). This finding aligns with the results of Alawamleh et al. (2023), who attribute low perceived behavioral control to limited infrastructure, slow bureaucracy, and a lack of mentorship from industry practitioners.

This finding aligns with research by Grilli et al. (2023), which shows that talented individuals remain unmotivated to take entrepreneurial risks without policy support and incentives. In other words, individual motivation alone is insufficient without a conducive environment.

How does the interaction between individual agency and institutional structures shape technopreneurial outcomes?

This question is at the heart of this research's findings. The results indicate that individual agency and institutional structures are not separate entities, but rather interact dynamically in shaping technopreneurial outcomes. On the one hand, there is a strong sense of individual agency. Some lecturers demonstrate a positive attitude toward innovation, possess technological skills, and can create creative solutions even with limited resources. They are change agents who drive bottom-up innovation.

However, institutional structures act as a barrier. The absence of strategic policies, incentives, or supporting infrastructure prevents these innovations from developing into products with sustainable economic or social value. Innovation remains a personal project, not part of an institutional ecosystem.

This interaction can be explained through the TPB framework: although attitudes and subjective norms may be supportive, behavior does not emerge due to low perceived behavioral control resulting from weak structures. As emphasized by Esteve-Mon et al. (2023), digital transformation in higher education encompasses not only competencies but also supporting structures. Thus, current technopreneurial outcomes are fragmented and individualistic, rather than systemic and institutionalized. Individual agency is capable of initiating innovation, but without structural support, such innovation cannot "grow" and "spread".

Theoretical and Practical Implications

Theoretically, this research enriches the understanding of technopreneurship in higher education by demonstrating that its success is determined not only by individual competence but by the dialectical interaction between agency and structure. These findings support the argument of Version et al. (2021) that a sustainable technopreneurial ecosystem requires synergy between policy, culture, and individual capacity.

Practically, this research provides concrete recommendations for higher education: 1) Integrate technopreneurship into the academic performance assessment system (SKP) and functional positions; 2) Establish technology incubators that provide access to funding, mentorship, and prototyping facilities; 3) Revise the curriculum with a real-life project-based technopreneurship course; 4) Provide comprehensive training on intellectual property rights, digital business models, and innovation management; 5) Build strategic partnerships with industry and local governments.

Limitations and Directions for Further Research

This study has limitations, particularly in its geographic scope (a single university) and sample size. Therefore, further research could expand on these findings through cross- institutional comparative studies or quantitative approaches to statistically test the relationship between institutional support and technopreneurial intentions. Furthermore, a deeper exploration of students' roles as agents of change is also needed.

CONCLUSION

Technopreneurship has transformational potential for higher education, but its success depends on the synergy between individual agency and institutional support. At Ivet University, although some faculty and students demonstrate potential, systemic barriers hinder the formation of a sustainable technopreneurial ecosystem. To realize the full potential of technopreneurship, higher education institutions must move beyond ad-hoc initiatives and adopt comprehensive strategies that encompass policy reform, resource allocation, and cultural change. In doing so, they can become true engines of innovation, contributing to economic growth and sustainable development in line with global trends.

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REFERENCES

- Alawamleh, M., Francis, Y. H., & Alawamleh, K. J. (2023). Entrepreneurship Challenges: The Case of Jordanian Startups. *Journal of Innovation and Entrepreneurship*, 12(1). <https://doi.org/10.1186/s13731-023-00286-z>
- Aliedan, M. M., Elshaer, I. A., Alyahya, M. A., & Sobaih, A. E. E. (2022). Influences of University Education Support on Entrepreneurship Orientation and Entrepreneurship Intention: Application of Theory of Planned Behavior. *Sustainability (Switzerland)*, 14(20). <https://doi.org/10.3390/su142013097>

- Altantsetseg, P., Dadvari, A., Munkhdelger, T., Lkhagvasuren, G. O., & Moslehpour, M. (2020). Sustainable development of entrepreneurial orientation through social drivers. *Sustainability* (Switzerland), 12(21), 1–19. <https://doi.org/10.3390/su12218816>
- Badoiu, G. A., Segarra-Ciprés, M., & Escrig-Tena, A. B. (2020). Understanding employees' intrapreneurial behavior: a case study. *Personnel Review*, 49(8), 1677–1694. <https://doi.org/10.1108/PR-04-2019-0201>
- Basilotta-Gómez-Pablos, V., Matarranz, M., Casado-Aranda, L. A., & Otto, A. (2022). Teachers' digital competencies in higher education: a systematic literature review. *International Journal of Educational Technology in Higher Education*, 19(1). <https://doi.org/10.1186/s41239-021-00312-8>
- Čajka, P., Čajková, A., & Krpálek, P. (2023). The role of universities as the institutional drivers of innovation at the regional level. *Terra Economicus*, 21(1), 94–107. <https://doi.org/10.18522/2073-6606-2023-21-1-94-107>
- Esteve-Mon, F. M., Postigo-Fuentes, A. Y., & Castañeda, L. (2023). A strategic approach of the crucial elements for the implementation of digital tools and processes in higher education. *Higher Education Quarterly*, 77(3), 558–573. <https://doi.org/10.1111/hequ.12411>
- Filser, M., Kraus, S., Roig-Tierno, N., Kailer, N., & Fischer, U. (2019). Entrepreneurship as catalyst for sustainable development: Opening the black box. *Sustainability* (Switzerland), 11(16). <https://doi.org/10.3390/su11164503>
- Grilli, L., Mrkajic, B., & Giraudo, E. (2023). Industrial policy, innovative entrepreneurship, and the human capital of founders. *Small Business Economics*, 60(2), 707–728. <https://doi.org/10.1007/s11187-022-00611-y>
- Higgins, D., Refai, D., & Keita, D. (2019). Focus point: the need for alternative insight into the entrepreneurial education paradigm. *Journal of Small Business and Entrepreneurship*, 31(3), 225–242. <https://doi.org/10.1080/08276331.2018.1466851>
- Hoogstraaten, M. J., Frenken, K., & Boon, W. P. C. (2020). The study of institutional entrepreneurship and its implications for transition studies. *Environmental Innovation and Societal Transitions*, 36(May), 114–136. <https://doi.org/10.1016/j.eist.2020.05.004>
- Kalantaridis, C., & Küttim, M. (2021). University ownership and information about the entrepreneurial opportunity in commercialisation: a systematic review and realist synthesis of the literature. *Journal of Technology Transfer*, 46(5), 1487–1513. <https://doi.org/10.1007/s10961-019-09757-6>
- Linton, J. D., & Xu, W. (2021). education : What needs to happen next ? *The Journal of Technology Transfer*, 46(2), 393–406. <https://doi.org/10.1007/s10961-020-09786-6>
- Lv, M., Zhang, H., Georgescu, P., Li, T., & Zhang, B. (2022). Improving Education for Innovation and Entrepreneurship in Chinese Technical Universities: A Quest for

- Building a Sustainable Framework. *Sustainability* (Switzerland), 14(2). <https://doi.org/10.3390/su14020595>
- Lyken-Segosebe, D., Montshiwa, B., Kenewang, S., & Mogotsi, T. (2020). Stimulating academic entrepreneurship through technology business incubation: Lessons for the incoming sponsoring university. *International Journal of Higher Education*, 9(5), 1–18. <https://doi.org/10.5430/ijhe.v9n5p1>
- Menter, M. (2024). From technological to social innovation: toward a mission-reorientation of entrepreneurial universities. *Journal of Technology Transfer*, 49(1), 104–118. <https://doi.org/10.1007/s10961-023-10002-4>
- Moss, P., Hartley, N., & Russell, T. (2022). Integration intrapreneurship: implementing innovation in a public healthcare organization. *Journal of Innovation and Entrepreneurship*, 11(1). <https://doi.org/10.1186/s13731-022-00248-x>
- Ohanu, I. B., & Shodipe, T. O. (2021). Influence of the link between resources and behavioural factors on the entrepreneurial intentions of electrical installation and maintenance work students. *Journal of Innovation and Entrepreneurship*, 10(1). <https://doi.org/10.1186/s13731-021-00154-8>
- Satalkina, L., & Steiner, G. (2020). Digital entrepreneurship and its role in innovation systems: A systematic literature review as a basis for future research avenues for sustainable transitions. *Sustainability* (Switzerland), 12(7). <https://doi.org/10.3390/su12072764>
- Syed, R. T., Singh, D., & Spicer, D. (2023). Entrepreneurial higher education institutions: Development of the research and future directions. *Higher Education Quarterly*, 77(1), 158–183. <https://doi.org/10.1111/hequ.12379>
- Towers, N., Santoso, A. S., Sulkowski, N., & Jameson, J. (2020). Entrepreneurial capacity- building in HEIs for embedding entrepreneurship and enterprise creation – a tripartite approach. *International Journal of Retail and Distribution Management*, 48(8), 881– 899. <https://doi.org/10.1108/IJRDM-06-2019-0185>
- Vaz, R., de Carvalho, J. V., & Teixeira, S. F. (2023). Developing a Digital Business Incubator Model to Foster Entrepreneurship, Business Growth, and Academia– Industry Connections. *Sustainability* (Switzerland), 15(9). <https://doi.org/10.3390/su15097209>
- Version, D., Journal, A. E., & Journal, A. E. (2021). Amsterdam University of Applied Sciences From individual sustainability orientations to collective sustainability innovation and sustainable entrepreneurial ecosystems From individual sustainability orientations to collective sustainability innovation and.
- Wagner, M., Schaltegger, S., Hansen, E. G., & Fichter, K. (2021). University-linked programmes for sustainable entrepreneurship and regional development: how and with what impact? *Small Business Economics*, 56(3), 1141–1158. <https://doi.org/10.1007/s11187-019-00280-4>
- Weckesser, A., & Denny, E. (2022). BJOG Perspectives – qualitative research: analysing data and rigour. *BJOG: An International Journal of Obstetrics and Gynaecology*, 129(8), 1406–1407. <https://doi.org/10.1111/1471-0528.17148>

- Xu, L., Zhang, J., Ding, Y., Zheng, J., Sun, G., Zhang, W., & Philbin, S. P. (2023). Understanding the role of peer pressure on engineering students' learning behavior: A TPB perspective. *Frontiers in Public Health*, 10. <https://doi.org/10.3389/fpubh.2022.1069384>
- Yordanova, D., Filipe, J. A., & Coelho, M. P. (2020). Technopreneurial intentions among Bulgarian STEM students: The role of university. *Sustainability (Switzerland)*, 12(16), 1– 19. <https://doi.org/10.3390/su12166455>