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Identification of Inhibiting Factors in Triple Helix Collaboration in the Commercialization Process at a Private University in Indonesia

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Abstract

Collaboration between a university, industry, and government (Triple Helix) in supporting commercialization still faces obstacles. The goal of this research is to identify the inhibiting factors of Triple Helix collaboration in commercialization at a private university in Indonesia. The method used is qualitative with a descriptive and case study approach. The research findings show that the university plays a role as a provider of research and innovation. The industry plays roles as an idea generator, early adopter, producer, capital provider, and end user. The government acts as a regulator, funding provider, innovation user, research partner, and collaboration facilitator. Inhibiting factors from the university include limited incentives, differences in goals with the industry, and a lack of experts. From the industry perspective, obstacles include dependence on foreign technology, insufficient understanding of the university's capacity, and a dynamic market. From the government's perspective, obstacles include ineffective policies, limited budget allocation, and suboptimal coordination. To address these inhibiting factors, the university needs to improve internal coordination, optimize commercialization schemes, increase the number of experts, and develop industrial gathering activities. The industry should better understand academic needs, increase funding allocation, and adopt Open Innovation approaches. The government needs to enhance collaboration activities, research funding, streamline administrative processes, and create a comprehensive commercialization scheme. This research provides a deep understanding of the inhibiting

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factors of Triple Helix collaboration in commercialization at a private university in Indonesia.

Keywords: Commercialization, Private University, Triple Helix

INTRODUCTION

Innovation plays a crucial role in achieving sustainable economic growth (Maradana et al., 2017). Airlangga Hartarto, the Coordinating Minister for the Economic, emphasizes the importance of innovation in the economic transformation process, stating that Indonesia's development progress heavily relies on innovation (Avisena, 2023). Innovation is the key that allows countries in the Asia-Pacific region to achieve rapid growth and improve their global standing (Clarke & Lee, 2018). This phenomenon is evidenced by the rise of countries known as the 'Asian Tigers,' such as South Korea, Taiwan, Singapore, and Hong Kong. Recently, China has also emerged as a 'giant' in the realm of innovation, providing a clear example of the positive impact of innovation in solidifying a country's position on the international stage. This impressive development highlights innovation as a core pillar in efforts for economic development and progress (Clarke & Lee, 2018).

Innovation is the initial step in the commercialization of an invention (NSU Florida, 2024). Commercialization is essential for developing innovation into products or services that can be widely marketed (Still, 2017). According to the National Medium-Term Development Plan (RPJMN) supporting the implementation of Indonesia's Vision 2045, there are programs aimed at enhancing research in higher education and commercializing research results to support economic growth (Badan Perencanaan Pembangunan Nasional, 2019). This aligns with the Strategic Plan of Private University, which describes the vision and mission of private university to become Entrepreneurial University contributing to national economic development. The primary focus of private university is on the development of ideas, maturation of ideas, and commercialization of ideas to increase the quantity of innovation and commercialization of research outcomes.

The key to stimulating the growth of the innovation ecosystem in Indonesia involves three main elements functioning as primary pillars: university (academics), industry, and government (Kementerian Sekretariat Negara Republik Indonesia, 2020). The Triple Helix model recognizes the importance of collaboration among these three main pillars—university, industry, and government—as the main force driving innovation and commercialization (Afzal et al., 2018). One of the concepts emphasized in the

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National Medium-Term Development Plan (RPJMN) is strengthening Triple Helix cooperation (Badan Perencanaan Pembangunan Nasional, 2019). revious research confirms that Triple Helix collaboration is considered a key element contributing to success in the commercialization process (Afzal et al., 2018; Guerrero & Urbano, 2017).

However, according to Ophirtus Sumule, Director of the Innovation System at the Ministry of Research, Technology, and Higher Education, collaboration between university, industry, and government in supporting innovation and the commercialization process still faces obstacles (Setnas ASEAN, 2019). At the University of Medical Sciences Iran, Panahi & Chelehnia (2022) identified the most critical barrier to commercialization as the lack of effective communication channels between university, industry, and government. The issues in Triple Helix collaboration are caused by weak relationships and interactions, as well as differing work cultures among university, industry, and government. Ineffectiveness in collaboration among Triple Helix actors reflects barriers in efforts to commercialize research and innovation (Razak & White, 2015). Additionally, the Strategic Plan of Private University explains that a weakness in achieving the vision of an Entrepreneurial University is the suboptimal cooperation with industry and the need for government support.

Based on previous research titled "University Innovation Ecosystem Model (Case Study in Bandung Techno Park)" by Choeriyah & Noviaristanti (2021), Bandung Techno Park (BTP) faces challenges in the commercialization process. These challenges arise because BTP struggles to synergize Triple Helix actors from university, industry, and government within the innovation model. Although previous research and the intended research share similarities in the innovation collaboration between university, industry, and government, previous studies have not explored in depth the inhibiting factors of Triple Helix collaboration in the commercialization process at private university in Indonesia. Therefore, this study aims to fill this gap with the title "Identification of Inhibiting Factors in Triple Helix Collaboration in the Commercialization Process at a Private University in Indonesia."

LITERATURE REVIEW

Innovation

According to Everett Rogers in Kristiawan et al., (2018), innovation is an idea, practice, or object that is perceived as new by individuals or groups adopting it. Innovation is a process that drives progress by utilizing knowledge, technology, and experience to enhance the value of products (Gunawan et al., 2023). Innovation is a primary driver of

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economic growth (Hatammimi & Singgih, 2022). Innovation is closely linked to the development of a country, technological advancement, and serves as a key driver of success in the business world (Kotsemir & Abroskin, 2013). Innovation is the initial step in the commercialization of an invention (NSU Florida, 2024).

Commercialization

Commercialization is the transformation of knowledge into products or services to enhance an organization's competitive advantage and stimulate economic growth (Fitria & Subrata, 2023). Commercialization is essential for developing innovation into products or services that can be widely marketed (Still, 2017). The commercialization process often involves the transfer of intellectual property and technology to third parties to be used in refining existing products or creating new ones (Schelhorn & Herbers, 2022).

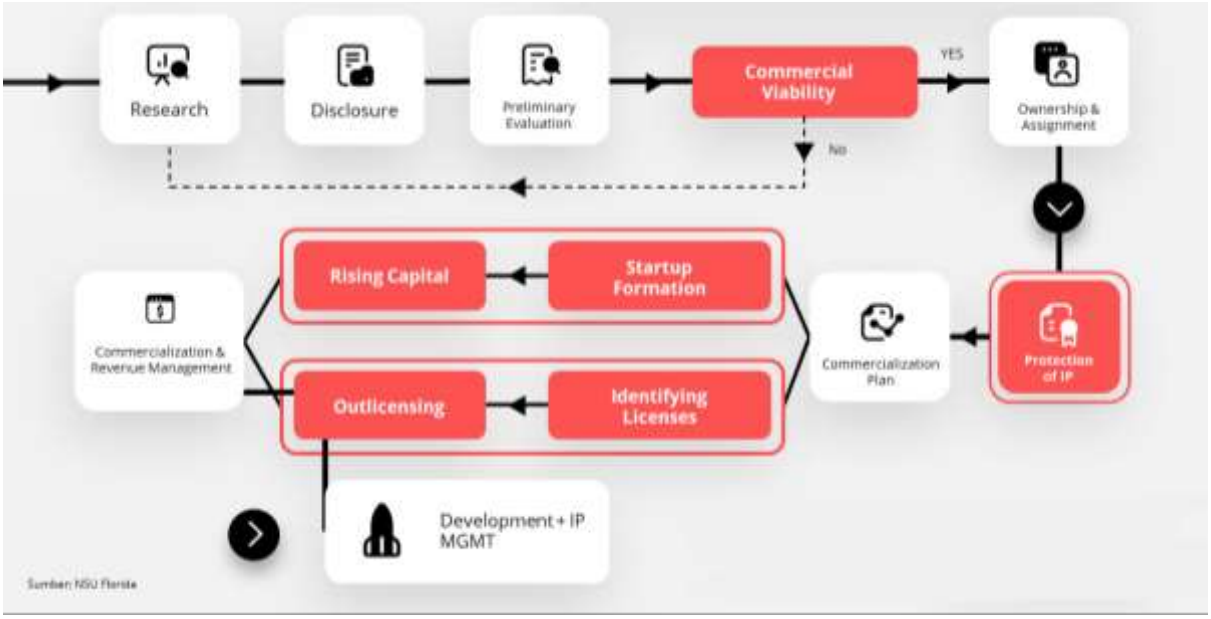


Figure 1. Commercialization Process (NSU Florida, 2024)

The first step in the commercialization of university inventions involves research conducted by faculty, staff, and students. If they discover something new and potentially commercial, they must submit an invention disclosure form to the Science Techno Park. The Science Techno Park staff will evaluate the invention based on novelty, patentability, competitive advantage, and commercial value. If the invention passes the evaluation, the Science Techno Park will work with external patent advisors to file the necessary

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documents. Once the intellectual property is protected, the Science Techno Park will plan the marketing and commercialization of the technology. Revenue from commercialization will be shared with the university (NSU Florida, 2024).

Triple Helix

The Triple Helix approach emphasizes that collaboration between university (academics), industry, and government is key to enhancing the innovation ecosystem (de Almeida Borges et al., 2020; Taufik & Amirulkamar, 2023). The role of university includes teaching to impart knowledge, conducting research to create innovations, and commercializing the resulting innovations (Ferdinands et al., 2024). Meanwhile, industry, as the main pillar of wealth creation, transforms the knowledge generated by university into products and seeks to create wealth through new technologies (Champenois & Etzkowitz, 2018). The government acts as a facilitator that connects academics with industry, promotes innovation development, provides funding, formulates policies, offers protection, monitors, and even becomes a user in the commercialization phase of innovations (Ferdinands et al., 2024).

Inhibiting Factors in Triple Helix Collaboration in the Commercialization Process

Several empirical studies have been conducted to investigate the issues and challenges faced by Triple Helix institutions, particularly in developing countries (Choeriyah & Noviaristanti, 2021; Ferdinands et al., 2024; Fitria & Subrata, 2023; Jatraningrum et al., 2021; Liche & Braun Střelcová, 2023; Pacheco & Paul, 2023; Safrianti et al., 2021). Overall, these findings indicate the presence of barriers in Triple Helix collaboration during the commercialization process, namely:

Table 1. Inhibiting Factors in Triple Helix Collaboration

Actor	Inhibiting Factors	Source
University	Insufficient incentives for developing innovations.	Liche & Braun Střelcová (2023)
	Differences in objectives between the academic world and industry, leading to results that do not align with needs.	Choeriyah & Noviaristanti (2021)

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	Lack of experts in developing innovations and commercializing knowledge.	Fitria & Subrata (2023); Jatraningrum et al. (2021)
Industry	Dependence on advanced countries' technology, leading to less interest in local technology.	Liche & Braun Střelcová (2023)
	Insufficient understanding of the capacity and capabilities of academic research.	Jatraningrum et al. (2021)
	A dynamic market and inconsistency in raw material prices.	Safrianti et al. (2021)
Government	Ineffective implementation of policies.	Pacheco & Paul (2023)
	Inadequate budget allocation for research projects.	Ferdinands et al. (2024)
	Lack of coordination in the development and implementation of policies.	Ferdinands et al. (2024)

Source: Processed by the Author (2024)

Conceptual Framework

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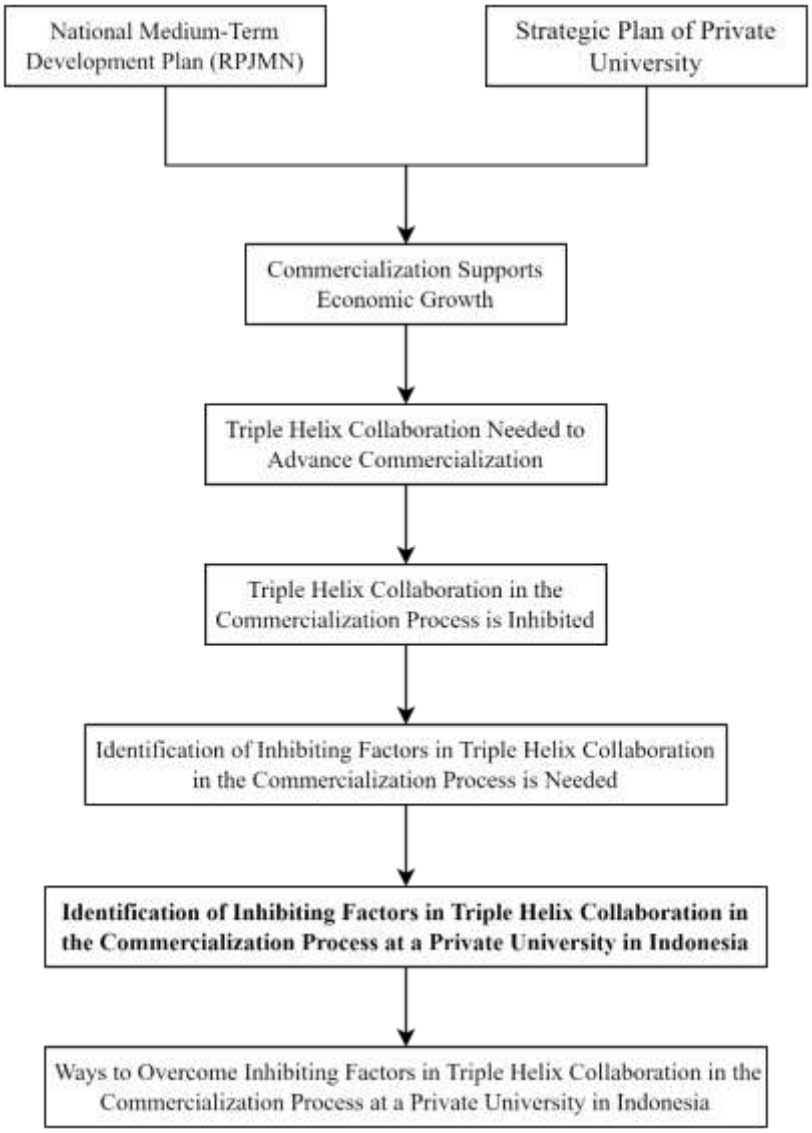


Figure 2: Conceptual Framework (Processed by the Author, 2024)

RESEARCH METHODOLOGY

Based on the research methodology, this study adopts a qualitative approach. Qualitative research aims to describe the research object based on social activities, attitudes, and perceptions of individuals or groups (Abdussamad, 2021). According to the research objectives, this study falls into the descriptive approach. This approach is

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considered naturalistic, where the collected data are analyzed in the form of words or images with the main goal as the central point (Sugiyono, 2022).

The research object is a private university in Indonesia. Activities conducted to gain a deeper understanding of this phenomenon include interviews, secondary data collection, and direct observation, focusing on Triple Helix collaboration in the commercialization process at a private university in Indonesia. The informants for this research are experts and external parties related to the private university.

Table 2. Criteria for Informants

No	Criteria
1.	An expert from the private university.
2.	An external party associated with the private university.
3.	Knowledgeable about Triple Helix collaboration at private university.
4.	Knowledgeable about the commercialization process at private university.
5.	Available time to provide information.

Source: Processed by the Author (2024)

Data collection techniques are carried out using semi-structured interviews through audio recordings and documentation in the form of photos. The primary data source for this research is interview results, obtained directly from the informants. The data analysis technique for this study adopts the Miles and Huberman data analysis model, which consists of three simultaneous stages: Data Reduction, Data Display, and Conclusion Drawing and Verification (Sugiyono, 2022).

RESULT

Triple Helix Actors and Their Roles in the Commercialization Process

1. University

In Triple Helix collaboration, university act as academic institutions that provide research results and innovative products. The commercialization process at private university involves supporting units such as the Center of Excellence (CoE), the Directorate of Research and Community Service, and the Science Techno Park. The CoE is responsible for producing products or research that can be commercialized and

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involves various disciplines from multiple faculties and experts. The Directorate of Research and Community Service is the organization overseeing research at the university and manages research funding. The Science Techno Park facilitates the development of innovations and the commercialization of research results. This is supported by theories that describe university as playing a role in imparting knowledge, conducting research to create innovations, and commercializing those innovations (Ferdinands et al., 2024).

2. Industry

Industry provides ideas or problems that form the basis for product needs. Industry acts as an early adopter by testing products in real-world situations before they are widely marketed. Additionally, industry serves as a producer by providing production facilities to scale up research results and participates in providing capital. In the commercialization aspect, industry is involved in trading and sales. Industry may also purchase products developed by university inventors or innovators, which are produced by other industries, thus becoming the end user of the developed products. Moreover, industry receives licenses for production and sales, generating royalties for the university. This role positions industry as a key pillar in creating economic value and wealth from research and innovation (Champenois & Etzkowitz, 2018).

3. Government

The government acts as a regulator by establishing regulations that govern the commercialization of innovations. Additionally, the government provides funding for research and acts as a user of innovative products from university, such as actions taken by local governments. As a research partner, the government collaborates with university through agencies like BRIN. The government also plays a role in facilitating activities that bridge inventors and innovators with industry. This aligns with previous theories that describe the government as a facilitator connecting academics with industry, promoting innovation development, providing funding, formulating policies, offering protection, monitoring, and even becoming a user in the commercialization stage of innovations (Ferdinands et al., 2024).

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Inhibiting Factors in Triple Helix Collaboration in the Commercialization Process

Table 3. Research Findings Based on Previous Studies

Inhibiting Factors	Source	Research Findings
University		
Insufficient incentives for developing innovations.	Liche & Braun Střelcová (2023)	Internal incentives are sufficient only up to the innovation stage and are still inadequate for the commercialization stage. Commercialization requires costs for testing, certification, and product development, especially for hardware.
Differences in objectives between the academic world and industry, leading to results that do not align with needs.	Choeriyah & Noviaristanti (2021)	There are differences in objectives between the academic world and industry, resulting in research outcomes that do not align with market needs. Most academic research results are still in prototype form and not yet ready for mass use. There is a gap between academic innovations, which tend to be general, and the more specific needs of industry. Evaluations often reveal discrepancies between innovations and industry needs, particularly in terms of cost, market, and the long research time required for industries that need quick solutions.
Lack of experts in developing innovations and commercializing knowledge.	Fitria & Subrata (2023); Jatraningrum et al. (2021)	There is still a lack of expertise in private university to reach the commercialization stage. Additionally, the expertise is not very diverse, and interdisciplinary collaboration needs to be improved. The involvement of external experts is also limited, and the heavy workload of innovators further hampers the commercialization process.
Industry		

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Dependence on advanced countries' technology, leading to less interest in local technology.	Liche & Braun Střelcová (2023)	Industries in Indonesia are highly dependent on foreign technology, especially in the IT, electronics, and telecommunications sectors. This dependency is due to the unavailability of local products while foreign products are more ready and available. Moreover, the small and costly local production capacity, along with the industry's focus on profit, drives them to choose fast and cheap foreign technology. The established ecosystem of foreign products and trust in foreign technology further reinforces this dependency.
Insufficient understanding of the capacity and capabilities of academic research.	Jatraningrum et al. (2021)	Most industries in Indonesia lack understanding of the capacity and capabilities of academic research. Industries have less confidence in domestic products. They focus more on profits and quick solutions with foreign products, whereas university require time and funding for research.
A dynamic market and inconsistency in raw material prices.	Safrianti et al. (2021)	Dynamic markets and inconsistent raw material prices hinder the commercialization process. Dependence on imported materials due to the absence of local component industries, price fluctuations, and raw material shortages cause delays in research and often necessitate rework. Additionally, industries may cancel production due to inefficiencies and lack of continuity guarantees.
Government		

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Ineffective implementation of policies.	Pacheco & Paul (2023)	Government policies related to Triple Helix collaboration have not been fully effective. The complexity of administrative processes and the detailed financial accountability requirements from the government are significant barriers for researchers. Additionally, organizational changes in government reduce focus on intermediary institutions like Science Techno Park.
Inadequate budget allocation for research projects.	Ferdinands et al. (2024)	Government budget allocation for research commercialization still needs improvement. The strict and competitive allocation process results in only about 50-60% of research budgets being realized. Compared to other countries, Indonesia's research budget, which is less than 1% of Gross Domestic Product (GDP), indicates an urgent need for increased research funding.
Lack of coordination in the development and implementation of policies.	Ferdinands et al. (2024)	Government coordination related to Triple Helix collaboration faces several challenges, such as coordination issues between government agencies, lack of joint discussions, and the impact of organizational changes in government that reduce coordination intensity. Support for the ecosystem for research commercialization is also inadequate.

Source: Processed by the Author (2024)

Ways to Overcome Inhibiting Factors in Triple Helix Collaboration in the Commercialization Process

Table 3. Ways to Overcome Inhibiting Factors in Triple Helix Collaboration

Inhibiting Factors	Source	Ways to Overcome
University		

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Insufficient incentives for developing innovations.	Liche & Braun Střelcová (2023)	1. Research funding in Indonesia needs to be increased to be on par with other countries. 2. Industry should allocate more funds for research. 3. Private university need to enhance internal coordination and develop better schemes among Science Techno Park, Directorate Research and Community Service, Foundation for Education and Research, faculties, departments, and expertise groups for commercialization.
Differences in objectives between the academic world and industry, leading to results that do not align with needs.	Choeriyah & Noviaristanti (2021)	1. University should establish closer relationships with industry. 2. Science Techno Park, as a mediator, should develop industrial gathering activities to collect data on industry needs and challenges and communicate them to university innovators. 3. University should involve industry early in research by conducting market research and interviews to understand real needs. 4. Industry should be more open to sharing information and collaborating through an Open Innovation approach.
Lack of experts in developing innovations and commercializing knowledge.	Fitria & Subrata (2023); Jatraningrum et al. (2021)	1. Directorate Research and Community Service should be enhanced to assist with the administration and management of research and innovation projects.

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		2. Involve external experts, such as those from BRIN (National Research and Innovation Agency). 3. Increase interdisciplinary collaboration to ensure a diverse range of expertise. 4. University need to review policies related to the workload of innovators.
Industry		
Dependence on advanced countries' technology, leading to less interest in local technology.	Liche & Braun Střelcová (2023)	1. The government should encourage the public to value domestic innovation more. 2. Industry should allocate more funds for research. 3. Industry should build stronger relationships with academia to strengthen the ecosystem.
Insufficient understanding of the capacity and capabilities of academic research.	Jatraningrum et al. (2021)	1. Industry should understand that academia requires adequate infrastructure and funding to conduct research quickly and efficiently. 2. Industry should be more open to sharing information and collaborating through an Open Innovation approach. 3. Industry should establish closer relationships with academia to strengthen the ecosystem. 4. University should establish closer relationships with industry.
A dynamic market and inconsistency in raw material prices.	Safrianti et al. (2021)	1. Industry needs ensure the availability of raw materials and resources for research, reducing dependence on the market.
Government		

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Ineffective implementation of policies.	Pacheco & Paul (2023)	1. Government commercialization schemes and programs should be more comprehensive and sustainable to support the entire process from upstream to downstream. 2. The government should streamline administrative processes to accelerate commercialization. 3. Grant costs given directly to industry should be periodically evaluated to ensure successful commercialization of research outcomes.
Inadequate budget allocation for research projects.	Ferdinands et al. (2024)	1. Research funding in Indonesia needs to be increased to be on par with other countries.
Lack of coordination in the development and implementation of policies.	Ferdinands et al. (2024)	1. The government should increase activities that bring together industry, academia, and government. 2. Coordination between central and regional governments, as well as among various parties involved in the commercialization process, needs to be improved.

Source: Processed by the Author (2024)

CONCLUSION

The findings of this study identify that university, as providers of research and innovation, play a role in the commercialization process. Industry contributes ideas, acts as an early adopter, produces, provides capital, and becomes the end-user that markets the product and pays royalties to the university. The government functions as a regulator, provides funding, utilizes innovations, partners in research, and facilitates collaboration between university and industry.

Barriers faced by university include insufficient internal incentives, discrepancies in objectives between academia and industry causing research outcomes that do not meet market needs, and a shortage of experts. For industry, the challenges include

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reliance on foreign technology, a lack of understanding of the research capacity and capabilities of university, and a dynamic market with inconsistent raw material prices. For the government, the issues are the partial effectiveness of policies related to Triple Helix collaboration, inadequate government budget allocation, and obstacles in coordination related to Triple Helix collaboration.

To address these barriers, university should improve internal coordination, optimize commercialization schemes, increase the number of experts, develop industrial gathering activities, and review policies related to the burden on innovators. Industry needs to better understand academic needs, allocate more funds for research, ensure the availability of raw materials, and enhance collaboration through Open Innovation approaches. The government should increase collaborative activities, boost research funding, simplify administrative processes, encourage greater appreciation of local products, and create a comprehensive commercialization scheme from start to finish while regularly evaluating it.

The results of this study are expected to serve as a foundation for future research on the barriers to Triple Helix collaboration in the commercialization process at private university in Indonesia using quantitative methods. Future research is also recommended at different university to gain a deeper understanding of the barriers to Triple Helix collaboration in the commercialization process at other institutions.

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