

The Learning Evaluation of Business Incubator's Role in Developing Technology-Based Startups at Technology Business Incubator

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Abstract. *Technology-based startup plays a vital role in improving the Indonesian economy. There are thousands of units of technology-based startups, though most of them are not adequately sustainable. The inadequacy is attributed to the fact that the products or services created are not in line with market needs and do not help understand business processes. Universities play an essential role in developing startups through business incubators to compete in the digital age. There is no conducive learning environment for business incubators in Indonesia, though the national standards are used. This research evaluates the learning process in a Technology Business Incubator in Bandung University using case study methods. Data is collected by performing in-depth interviews with three incubator managers and seven startup founders or tenants who have completed the incubation process. The business industry consists of education, design, printing, and fishery, while the interviews cover the process before, during, and after incubation, including the tenant's selection criteria and stages, learning processes in incubators and facilities, after graduation programs, and measurement of the impacts. The results show that the practices fit the ideal conditions, including training-focused and knowledge sharing session programs or skills, knowledge provisions, and expertise improvement programs for tenants, rental system facilities for graduates, and commercialization support. Furthermore, there are opportunities to improve several aspects, including developing tenant admission selection criteria, effective learning approaches, coaching, networking, and broader funding, graduation criteria, monitoring for graduates, and a more comprehensive range of impact measurement. This research helps guide business incubators to prioritize developing aspects of services. Moreover, evaluation using the mixed method is open for further investigation.*

Keywords: *Business Incubator, Pre-incubation, Main incubation, Post-incubation, Startup, Learning Evaluation*

1. Introduction

The Covid-19 pandemic speeds up technology adoption in the digitalization era throughout Indonesia. Pandemic has opened up opportunities for implementing business ideas as a smart solution in adapting to the new habits. This has encouraged many digital startups to take the opportunities in various creative industry sectors, which continues to have tremendous growth in Indonesia. This is especially the case in the digital creative industry, which has had significant growth in recent years. According to MIKTI (Masyarakat Industri Kreatif Teknologi Informasi), the number of startups in 2018 was 992, distributed in Jabodetabek 522

(52.62%), Central Java 30 (3.02%), Yogyakarta 54 (5.44%), West Java 44 (4.44%), East Java for 113 (11.39%), Bali & NTB 32 (3.23%), Kalimantan 24 (2.42%), Sulawesi 34 (3.43%), Sumatera 115 (11.53%), and other residents 24 (2.42%). The rapid use of the internet in Indonesia stimulates startups' growth (MIKTI, 2018). According to APJII (Asosiasi Penyelenggara Jasa Internet Indonesia), there were 196.7 million (73.7%) internet users in the second quarter of 2020. This was an increase of 25.5 million users compared to 2019 (Jatmiko, 2020).

The increase of internet users during the pandemic led to rapid digitalization in various sectors, including education, information and communication, finance, transportation, and

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trade. They need to adapt to new habits has pushed people to interact in different ways while carrying out daily activities. This leads to the acceleration of valuation for startups with a broad market in Indonesia, such as Gojek, Tokopedia, Traveloka, OVO, Bukalapak, and JD.ID. These six startups have been valued to be more than US\$ 1 billion, equivalent to 14 trillion rupiahs (unicorn). With investments from Mitsubishi UFJ Financial Group, Mitsubishi Corporation, and Mitsubishi Motors, the valuation of Gojek from July 2019 is more than US\$ 10 billion (decacorn) (Eka, 2020).

The presence of 1 decacorn and five unicorns shows that Indonesia's competitiveness is gradually increasing in this digital era. This success is supported by various parties for the upbeat pace in the digital creative industry to continue increasing. For example, the government launched policies related to e-commerce and industry 4.0 and various programs, such as BEKRAF for Pre-Startup, 1,000 Startups, BEKRAF Developer Day, UKM Go Online, and Startup Funding. Apart from the government, other stakeholders also took the initiative to support startup development. Most organizations implement and organize several programs, starting from state-owned enterprises, national private and multinational companies, universities, to associations and communities (MIKTI, 2018).

Tough competition and dynamic community started to challenge the local startups' durability. Business survival relies heavily on speed and ability to adapt to the market's condition in maintaining productivity and profitability. Most startups failed to develop and got out of business due to failure to adapt to this digital age's competitive conditions. Startups' success rate in various parts of the world is still low, only at 5 percent. According to the Bureau of Labor Statistics (BLS) report, about 50% of startups failed in their first four years of operation. Specifically, 19% and 18% failed due to the tight business competition and pricing/cost issues, respectively (Yadika, 2019).

The low success rate of startups encourages various parties to find a solution by creating sustainability programs and facilities. In this case, universities play a significant role in forming a more competitive startup. Observations made as preliminary data information research show that many startups created a perfect concept and technology solution. However, they slightly ignored an aspect of the market, which is one of the failure's drivers in the startup's sustainability.

Universities made efforts to increase the startup success rate, such as organizing startup incubation programs from faculty to university level. Currently, business incubators are widely developing at both public and private universities throughout Indonesia. Research and interviews with startup experts showed that Indonesia's business incubators do not have an ideal national standard in organizing various programs. Some of the well-known universities implicitly state that their incubation practices are the best. The incubators have to learn best practices from abroad because national standard incubation is still ambiguous. One of the incubators managed by the University of Bandung also experienced ambiguous conditions that caused ineffectiveness in organizing incubation programs. This affects the sustainability of the startup after completing the incubation process. According to Noor (2017), 70%-90% innovative business ideas could not be implemented due to the lack of a supporting ecosystem.

According to MIKTI (2018), business incubators have five obstacles: facilities, human resources, markets, capitals, and regulation. According to Eka (2018), AMIKOM Business Park (ABP) struggles with a business focus, capital, or market access. In general, incubators' constraints include capitals, markets, networks, and human resources.

An incubation startup evaluation is needed based on public constraints that limit the success rate. Previous studies were identified the success factors in an Incubation (Al-

Mubarak & Busler, 2012; Gozali, Masrom, Haron, & Zagloel, 2015; Somsuk & Laosirihongthong, 2014), facilities, incubation governance, and support (Gerlach & Brem, 2015; Hillemane, Satyanarayana, & Chandrashekar, 2019; Wiggins & Gibson, 2003), the aftercare services (Lai & Lin, 2015), commercializing and transferring Knowledge (Jamil, Ismail, & Mahmood, 2015).

Several studies used data collection tools that have not been fully comprehensive, focusing on the incubation stages that lacked an in-depth description of the challenges. They only focused on data collection at the core of the incubation process. Previous studies evaluated the input process of the tenant's business plan and interview aspects (Hillemane et al., 2019; Van Weele, van Rijnsoever, & Nauta, 2017). They focused on incubator's programs evaluation (Barugahara, Maumbe, & Nzaro, 2019; Fukugawa, 2018; Van Weele et al., 2017; Xu, 2010), infrastructure identification, networks, and services (Carvalho & Galina, 2015), and services (Ratinho, Harms, & Groen, 2013; Vanderstraeten & Matthysens, 2012).

This study analyzes incubation practices from pre to post-incubation. The study aims to determine the effectiveness of the incubation process. The proposed research questions focus on

- a. The management team's experience during the pre-incubation process of tenants in Technology Business Incubator.
- b. The programs and facilities during the main incubation and post-incubation process in Technology Business Incubator.
- c. The management team's experience during the post-incubation process of tenants in Technology Business Incubator.

Furthermore, this study analyzes the effectiveness of pre-incubation, main incubation, and post-incubation processes in the Technology Business Incubator. It has an incubation process that involves providing comprehensive interview guidelines, starting from pre-incubation, incubation, and post-incubation. Practically, these research findings

can be an early warning for conducting a more in-depth evaluation and improving incubation services quality.

2. Literature Review

Technopreneurship has been growing for a long time, starting with in Silicon Valley in California, the origin of technopreneurship development. Silicon Valley is a place where many well-known world technology-based companies emanated from. The influence spread to Asia in the 1990s, including Indonesia. Technology-based companies in Indonesia started to develop around the 2000s.

Indonesia's technopreneurs development has a reasonably positive impact, significantly decreasing the percentage of educated unemployed (Lupiyoadi & Kurniawan, 2019). However, technopreneurs faced many obstacles, including management problems, such as goods/services not fitting the market and lack of funds and business models (CBInsights, 2019). In this case, the business incubator is a solution to the constraints experienced by the technopreneur. This is because it provides various needs for entrepreneurs, such as workplaces or shared services like office equipment, internet, and experts supporting the entrepreneurs' needs (MIKTI, 2018).

The Decree of the Minister of Cooperatives and SMEs No. 24/Per/M.KUKM/IX/2015 article 1 (Kementrian Koperasi dan UKM, 2015) states that:

1. An entrepreneurial incubator is an intermediation institution that conducts an incubation process for its participants.
2. Incubation is a process of coaching, mentoring, and development provided by entrepreneurial incubators to incubation participants.

These statements show that an incubator is a coaching place for startups with various services that support their needs.

The first incubator was established in the late 1970s and operated in the North-Eastern United States. Its development started during the 1980-1990s. After 1990, the concept spread worldwide with more than 7000 incubators, including Indonesia. The first academic publication of business incubators was published by Temali & Campbell in 1984 (Gerlach & Brem, 2015). Although this concept's development has existed since the 1970s, field research shows no common standard to be referred to as an ideal business incubator management guide yet. This literature review focuses on incubator business service models previously studied.

According to Gerlach and Brem (2015), there are three incubator business models, including pre-incubation, main incubation, and post-incubation. Similar findings were made by Hillemane et al. (2019), though there are some program differences in each stage. Wiggins and Gibson (2003) revealed a simpler incubator business model that includes stakeholders, incubators, and goals incubation processes. Other incubator model consists of infrastructures, network, and services (Carvalho & Galina, 2015).

Some models shown by various experts intersect, including networking, business skills (mentoring, workshops, entrepreneur programs), support services in the form of facilities (such as sharing space), legal and administrative management. The model that does not intersect includes the pre-incubation (early stage) and post-incubation (last stage).

The selection process's initial stages are different. For instance, some practices conduct the selection phase by collecting business plans and their percentages, while other authors research integratively by training (Gerlach & Brem, 2015; Lalkaka, 2006). Voisey, Jones, and Thomas (2013) stated that universities should conduct the selection process because it effectively determines the startup's needs that suit them and their environment.

According to Wiggins and Gibson (2003) and Hillemane et al. (2019), the final stage focuses on tenant's product innovation, job creation, profit, eco-development, and viable comparison global network and experimental practices. The research's framework was developed based on various literature studies. Gerlach and Brem (2015) stated that the final incubation process consists of tenant performance, incubators success (balanced with expected goals), and aftercare (affiliate programs). Fukugawa (2018) focused on startup's essential matters, such as human resources and technology. Van Weele et al. (2017) also added to the necessity of human resources from both startups and incubators that creates a balance between both sides to be ready for the incubation.

According to Bank Indonesia (2006), the incubator's learning process covers all aspects of main incubation, such as cooperation or synergy, and incubation management mentioned by Gerlach & Brem (2015) with development and shared skills, seed capital, service, space, and support. Another essential learning process about human resources' role involves incubation managers (Xu, 2010). Hillemane et al. (2019) explained network learning and incubator services.

According to Carvalho and Galina (2015) and Vanderstraeten and Matthyssens (2012), the incubator's learning process is included in its services. There are also networking, administration, and logistic services. Furthermore, universities' regulation and the government's support run the learning process (Gozali et al., 2015). Technology's support and human resources are also vital (Somsuk & Laosirihongthong, 2014). Somsuk and Laosirihongthong (2014) emphasized the need to focus on internal incubators' sources to provide strategical planning needed to fill the tenant's needs.

According to Gozali et al. (2015), several incubator success factors include facilities, funds, mentoring program, tenant's selection criteria, incubator management, university regulations, government, and infrastructures.

These factors are considered in analyzing the learning process to transfer ideas from incubators to tenants and stakeholders. The incubator then commercializes it to support the tenant's development (Jamil et al., 2015).

Apart from the products/services commercialization, other strategies include the climate of entrepreneurship, technology, employment, innovation, and economic diversification. Every aspect is considered an essential factor for developing future business incubators (Al-Mubarak & Busler, 2012). Incubator development is in line with the growth of entrepreneurship or programs that support it. This includes development courses and training facilities that support the incubator programs (Barugahara et al., 2019).

Post-incubation consists of several aspects, such as tenant's graduation criteria, including incubation period, facilities, tenant's goals, and incubator rights (Bank Indonesia, 2006). After graduation, tenants continue developing their business, supported by incubators. Lai and Lin (2015) mentioned several business incubators' services for post-incubation tenants, including human resources, capital, network, equipment, business plan, and executive strategy. According to Bank Indonesia (2006), mentoring is conducted during and after incubation. Hillemane et al. (2019) reported that post-incubation services push tenants to create a target market and develop better innovation. The post-incubation services help graduated tenants to survive in a real environment and minimize problems that might hinder the startup's development.

Previous evaluations partially focused on the incubation process, including the input process of business plan and interview aspects (Hillemane et al., 2019; Van Weele et al., 2017). Other authors examined the incubation program process (Barugahara et al., 2019; Fukugawa, 2018; Van Weele et al., 2017; Xu, 2010). At the same time, Carvalho and Galina (2015) focused on infrastructure identification, networks, and services, while

others focused on incubation services (Ratinho et al., 2013; Vanderstraeten & Matthyssens, 2012). This study focuses on comprehensive analysis, integrating various elements from pre-incubation, main incubation, and post-incubation based on Gerlach and Brem (2015). The program's elements examined are integrated from other studies (Barugahara et al., 2019; Carvalho & Galina, 2015; Fukugawa, 2018; Hillemane et al., 2019; Ratinho et al., 2013; Vanderstraeten & Matthyssens, 2012; Van Weele et al., 2017; Xu, 2010).

3. Methodology

The research's paradigm uses a post-positivism and deductive theory development approach (Creswell & Creswell, 2018). The research begins with a literature study to build a conceptual framework that serves as a guide to analyzing facts. The urgency of this study is motivated by the existing problems. However, this does not mean that there is no guide regarding what aspects will be examined (Ghina, Simatupang, & Gustomo, 2014).

A case study is used as the research's strategy, which primarily investigates a phenomenon focusing on several details of a case or topic (Neuman, 2014). It describes the activity in a phenomenon specifically to identify conditions already running well or need improvement.

A qualitative method is used because the research focuses on uncovering all business incubator activities' facts in detail. This approach provides a better understanding of the phenomena. The analysis unit is an organization where exploration will be conducted based on each incubator manager and the tenant's perspectives (Sekaran & Bougie, 2016). Cross-sectional time is applied since data collection was conducted in a specific time determined (Sekaran & Bougie, 2016). Figure 1 illustrates the stages of research methodology.

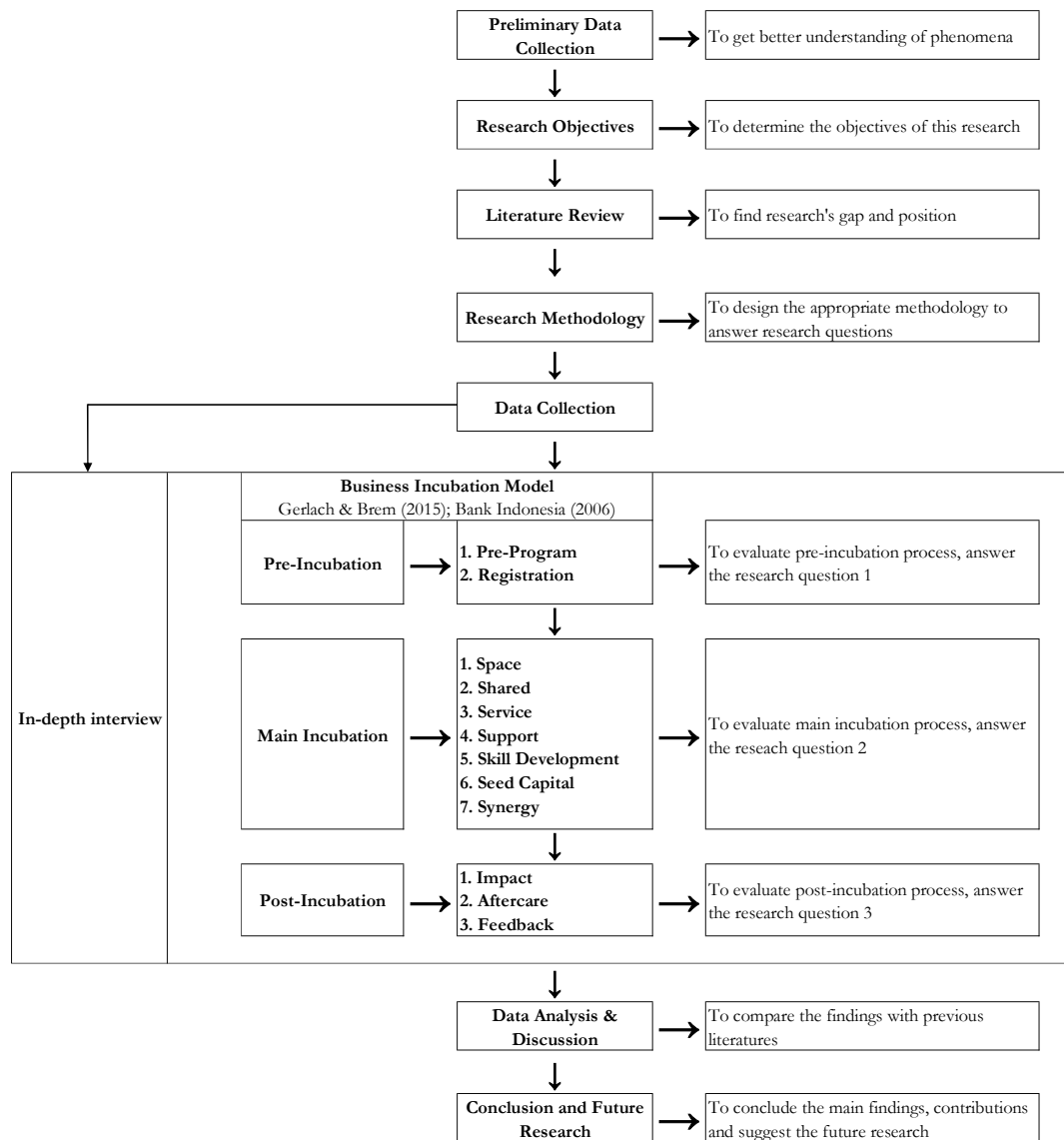


Figure 1.
Research Methodology Here

This research starts from preliminary data collection to obtain a better understanding of the business incubator. The objectives are formulated when exact problems are found. After informal interviews with the experts, the previous literature was examined to determine the research gap and position.

Data Collection

In this study, incubation's guide in developing technopreneur was adopted from Gerlach and Brem (2015). Guide for interview questions was obtained from the article and modified into open questions. The phenomenon was

analyzed using 18 attributes. This includes 1) five attributes of the pre-incubation concept with 13 interview questions, 2) eight attributes of the main incubation concept with 46 interview questions, and 3) five attributes of the post-incubation concept with 20 interview questions. The experts conducted face validation for these interview questions. Furthermore, pilot tests were also conducted on managers in other incubators to validate the measuring instruments used in the research. Table 1 shows the interview questions with the expected results. (see Appendix).

The social condition consists of several aspects, including

a. Place

The research object is Technology Business Incubator. Importantly, this incubator is sheltered by the university and produces technology-based entrepreneurship from its incubation process. However, general constraints should be identified and examined further to be developed as solutions.

b. Activity

Technology Business Incubator Activities begin from the selection process until after incubation, based on the managers' and tenants' perspectives.

c. Actor

Primary data is obtained from in-depth interviews with two informants, including the incubator's top management and tenants. The top management consists of a manager's assistant (Informant A), a current business incubator manager (Informant B), and a previous business incubator manager (Informant C), understanding the entire tenant's incubation process. They are supposed to have been a manager for more than one year. Others are seven startup founders (Informant D, E, F, G, H, I, J) that passed the business incubation period (tenants). The business industry consists of education, design, printing, and fishery. The effective interview duration of each respondent is about 60 minutes.

Purposive and snowball sampling is used as the informant's selection technique. Importantly, informants are determined based on who can provide information about the phenomenon being studied. However, others can be determined by previous informants' references (Neergaard & Ulhøi, 2007).

d. Artifact

Artifact in secondary data, including documents from internal incubators and information on the business incubator's website, helped understand the phenomenon better.

Data Analysis

After interviews with the respondents, audio data was transcribed and reduced to be further analyzed. The reduction results were presented in a table based on the group of respondents. According to Neuman (2014), there are three types of data reduction methods, including open coding (data testing for the initial category), axial coding (systematically arranged and interconnected), and selective coding (focus on identifying and selecting the supporting data based on the categories in the research concept). Several stages of analysis used include

- a. Data preparation includes interview transcripts or any other records to be grouped based on the type of information obtained. Afterward, data is studied to determine the general findings.
- b. Coding is performed to sort essential data relevant to research questions by conducting data collection and word classification and give them specific terms and icons.
- c. Describing coding's results is used to explain detailed case study research in descriptive form based on specific settings or sources of the analyzed data according to theme/topics (Creswell & Creswell, 2018).
- d. Interpretation and description of the previous stage's findings are conducted to finalize the analysis.

Validity and Reliability

Validity testing is used in 2 ways, credibility (internal validity) and dependability (reliability). Table 2 shows the summary of the validity test.

Table 2.
The Validity of Research (Yin, 2014).

Testing	Description	Case Study Tactics	Research Phase
Credibility	Refers on a series of items representing theories, ideas, and relationships between concepts that are being researched. This testing refers to objectivity and as bias control of the researchers.	a. Use triangulation from two groups of informants. b. Interview results that have been converted into the text are paired with the attributes within the conceptual framework. c. Use an explanation of a case study in the form of an in-depth narrative with interview excerpts.	Data analysis
Dependability	To test the research process by logical, traceable, and well-documented process. Research usually gains validity when other people re-conducts it.	a. Perform the interview with expected outcomes b. Providing the database of a case study that contains rich information about the informant's profiles.	Data collection

4. Findings and Discussion

There are three stages of the learning process during the incubation period, including pre-incubation, main incubation, and post-incubation.

a. Pre-Incubation Process

1) Criteria

The incubator has started to use the desirability and feasibility criteria of a startup registering for the tenant. However, viability criteria are yet to be considered as the requirements by incubators for tenant recruitments. Regarding feasibility, the specific criteria to be fulfilled by the startup apart from team requirements are still unclear. According to the incubator's top management, each group should consist of hackers, hustlers, and hipsters. *Hackers* are people with programming skills (programmers), while *hustlers* have marketing or financial abilities. *Hipsters* are innovative people who continue to innovate with products. In a startup, these three types of people are required to run the business. These criteria were sometimes not fulfilled by tenants, shown by the obstacles they faced, such as the lack of team members to create

technology-based programs. The following is a quote from interviews with informant A.

"For example, failure to include the fee for hiring the third-party programmer service or not doing the development ourselves means we need to spend our own money to pay off."

Determining the tenant's selection criteria follows some of the ideal conditions using "trifecta innovation." This includes desirability, which shows that the startup has proposed the right problem solving, feasibility, which assesses the appropriateness in managing businesses, and viability that examines the business's long-term value (Orton, 2017).

The criteria applied by the incubator focused on the startup's internal aspects without looking at the external ones. According to Bank Indonesia (2006), Gerlach & Brem (2015), Vanderstraeten & Matthyssens (2012), and Wiggins & Gibson (2003), the criteria for choosing tenants should be from internal and external aspects. Internal aspects, such as business plans, consists of ideas, technology, innovation, potential markets, and their impact. The external stakeholders relate to its incubator and value for the universities.

However, the result shows that this business incubator did not consider external aspects as selection criteria. This prompted further research to determine the extent of its impact on the tenants' sustainability that already has superior and innovative ideas. According to Gozali et al. (2015), the entry criteria are critical for successful e-business incubators.

2) Stages

Pre-incubation consists of proposal selection, pitching and interviewing, and graduation announcements. This situation is as quoted from the interview with informant C:

"In the admission process, we begin with the announcement, then receive the proposal and proceed to selection. Then after choosing the potential proposals, we invite them for pitching interview. Those who passed are accepted."

This is in line with Wiggins & Gibson (2003), which stated three stages of the selection process: business plan application, verbal presentation, and reviews of both processes. According to Gerlach & Brem (2015), some incubators only apply a mix of pre-incubation stages with training and business plan application.

3) Number of Applicants and Graduation Percentage

The number of applicants for each batch is about 20-30 startups, though this is not a standard for incubators. In this incubator, the percentage of tenants that graduated is only half of the applicants' number. This is because of the management team's capacity and capability.

4) Target

The main objective of this incubator is to improve the quality of tenants, not the quantity. This situation is in line with the quoted interview with informant A below.

"... We are currently focused on the incubation itself, not on the number of applicants."

This is in line with Somsuk & Laosirihongthong (2014), which stated that the incubator's mission is to embody the university's central vision, integrated with

other universities' missions. The incubator decides the tenant's admission target based on the college's policy. This explains why each incubator has a different target from the number of incubated tenants.

b. Main Incubation Process

1) Learning Programs

In this incubator, the learning program is conducted following the tenant's needs, focusing on mentoring both business and technical aspects. This is in line with informant A expression.

"... we are similar to mentoring empowering. Not everything is carried out through lecture. In case the tenants need a mentor, such as a marketing mentor, we assist them with related matters, not like a college lecture. Suppose some whom we see inadequate in knowledge, we will organize a training for them."

According to the tenants (Informant D, E, F, G, H, I, J, K), the coach provides assistance based on their needs.

Learning programs consist of business, technical and legal, integrated with sharing programs (mentoring or coaching), seminars, and workshops. Funding access is conducted simultaneously with networking. According to Hillemane et al. (2019), Gerlach & Brem (2015), Wiggins & Gibson (2003), learning consists of business, technical and legal aspects, and funding access.

However, this program did not run effectively because some tenants only focused on funding. Learning programs cannot be successful in case the tenants do not commit to building their startup. The incubator should remind them of the importance of the incubation process for startup sustainability. In general, incubators are primarily essential in educating startup founders through intervening (Van Weele et al., 2017).

2) Sharing Program

Sharing program includes mentoring and coaching. However, the incubator has only conducted mentoring because tenants were not ready for coaching. This is shown from

the interview with informant A:

"We used to have the coaching session, but now we are not doing it anymore since our main focus is mentoring. Based on evaluation, the newbies need mentoring more than coaching."

According to all tenants (Informant D, E, F, G, H, I, J, K), the coach always clarifies their startup problems.

Both mentoring and coaching programs have phases. This incubator performs more mentoring because the tenants are yet to mature and have not earned customer validation. In this phase, mentoring is necessary to accompany the tenants. The frequency of mentoring is flexible and based on the agreement between mentors and tenants. However, there are challenges in finding mentors suitable for the tenant's business. Later, the coaching phase is conducted when the tenant has earned consumer and product validation that is integrated as needed.

This implementation follows the ideal conditions, where mentoring is considered necessary for strategic planning, quality control, and learning process development to ensure that the process is comprehensive (Vanderstraeten & Matthyssens, 2012). According to Gozali et al. (2015), the mentoring program is one of the critical factors of a successful e-business incubator. Coaching is also a crucial program because it shapes the extent of the tenant's knowledge to pursue business survival (Carvalho & Galina, 2015).

3) Seminar and Workshop Programs

The seminar is expected to increase tenant's knowledge. Seminar and workshop programs were performed, went through a vacuum, and are expected to be repeated in the future. This is shown by the following expression from the interview with informant B.

"In case the seminar can be executed, we proceed to run the vacuum process beforehand. However, it has not been conducted for a long time. We have only performed it once since I got here."

According to the tenants (Informant D, E, F, G, H, I, J, K), they seldom join the seminar.

This seminar/workshop program is classified as a skill development and networking service. The incubators and the ministry execute the seminar's implementation. The incubator plays the role of the participant of the seminar. Training topics usually include technical skills. The problem with this program is that it is difficult to find a speaker that suits the tenant's needs, as stated by informant A.

"The problem lies in finding a suitable speaker, determining the topics, and finding the time because the tenants are quite busy with their businesses."

4) Funding Program

Funding is provided to small businesses access from internal and external incubators. This incubator received grants from various institutions, including *Kementerian Riset dan Teknologi/Badan Riset dan Inovasi Nasional Republik Indonesia* (formerly the *Kementerian Riset, Teknologi dan Pendidikan Tinggi* or *Kemenristekdikti*). The grant funding is given through a program called *Inovasi Berbasis Teknologi* (IBT) or *Perusahaan Pemula Berbasis Teknologi* (PPBT). However, some of the tenants in this incubator did not receive any funding. They received the funds from competitions in case they win, as shown by the tenant (informant G).

"No, we have never received any funds from any investors. We earned the funds from winning competitions, though we did not get much, usually around 5 – 10 million rupiah."

The other tenants (Informant D, E, F, H, I, J, K) said that they get funding from government support (PPBT). The incubator needs to immediately address this condition, even though it is still short of fund resources. According to Bank Indonesia (2006), to obtain a source of funds, incubators can cooperate with various stakeholders and save up allowances from business services carried out by incubators. According to Gozali et al. (2015), funding and support are critical factors of a successful e-business incubator.

5) Networking Program

The networking program is the incubator's synergy, where cooperation is established with every party, both university, and non-university. Tenant's participation runs incubator's networking program in various events to fulfill their social needs (Van Weele et al., 2017). The program's success depends on the tenant's ability, but the networking program's issue is related to the source of funds to run an event. This situation is following informant B's statement:

"Finding an institution that provides grant funding is rather difficult. Most venture capital schemes are different from grant funding schemes, which causes many changes, such as pivot that altered the core of the initial business or the initial vision that they have built. We are having a hard time finding grant agencies."

More problems also come from tenants having difficulty establishing a network with investors, so it becomes a challenge for incubators to provide any facilities or connect with the stakeholders and angel investors. These conditions are confirmed by all tenants (Informant D, E, F, G, H, I, J, K). In that case, a networking program is an essential aspect of business support service for incubators and tenants (Ratinho et al., 2013). According to Gozali et al. (2015), networking is a critical factor of a successful e-business incubator.

6) Facilities

The incubator provides physical facilities to support tenant's business development. According to the manager, it provided a workspace facility and the office infrastructure, where each facility has established its procedures. They provide a free facility for two years, though some terms and conditions apply. The following expression from informant B shows this:

"... we provide it free for two years. In case the tenant's business growth is good in the first year and there is a chance for it to grow, they can continue using the free facility for one more year. Suppose they did not, we cut them off from the free facility ..."

All the tenants (Informant D, E, F, G, H, I, J, K) stated that the incubation process's continuity depends on their performance.

Overall, the facilities provided by this incubator follow the ideal conditions, including helping businesses, such as office space, meeting room, and resource sharing, renting a place to collaborate, and exchanging ideas between tenants. The non-physical facility is learning services intended for tenants (mentoring, workshops, and seminars) and internet provisions (Carvalho & Galina, 2015). According to Gozali et al. (2015), the share service and facilities and system infrastructure are two critical factors for a successful e-business incubator.

c. Post-Incubation Process

1) Proof of Completion Program

After finishing the incubation for three years, the tenant will graduate, though they will be evaluated periodically within six months. Incubators and tenants admitted that they did not receive any proof of completion except for the database's record, as informant A stated in the interview:

"... No, but it is recorded in the database."

Also, there is proof of participation in the form of a contract, Memorandum of Understanding (MoU), or email. The incubator has difficulty determining the graduation criteria for tenants participating in the incubation process. Currently, incubators use simple criteria of the tenant's income, which is greater than the expenditure. Canada has several graduation criteria, such as failed/accomplished goals, determined incubation period, incubation management's authority, and facilities' criteria no longer adequate (Bank Indonesia, 2006). According to Gozali et al. (2015), the exit criteria are critical for a successful e-business incubator.

2) Programs

Managers or tenants do not perform the sharing season program. The networking program is performed indirectly through events and aims to support startup sustainability by building affiliations between

new tenants and those sustained. All tenants (Informant D, E, F, G, H, I, J, K) stated that they have offered to join certain events.

According to Bank Indonesia (2006), several programs like mentoring, networking, marketing, technical management, and ownership need to be well-established for a good relationship between managers and tenants. Furthermore, the event helps tenants commercialize their products, as shown in informant B's statement:

"...Indeed, we then commercialize their products. Professionally, there is free-market distribution, etc...."

The commercialization of products affects the incubator and university's value (Jamil et al., 2015).

3) Facilities

In post-incubation, the tenant's accessible facilities are limited and depend on the incubator's manager policy. Tenants owned by mentors may use facilities, or other tenants rented them. The incubator monitors the tenants who have completed their incubation period even though there are no detailed criteria for monitoring aspects. All the tenants (Informant D, E, F, G, H, I, J, K) stated that they have to rent certain facilities after post-incubation.

Facilities that tenants may access help them pass the transition period. Lai & Lin (2015:2287) stated that business incubators provided several services for the post-incubation stage, including human resources, capital, networking, equipment, business planning, and executive strategy. Incubators need experts in their fields, including organization and business experts (Somsuk & Laosirihongthong, 2014). In this incubator, there are still many opportunities to develop accessible facilities for those who have completed their incubation program.

4) Sustainable Target Startup

Incubators with many sustainable tenant graduates have their own added value. Currently, the incubator has three sustainable

startup tenants. Essentially, the tenants considered sustainable by the incubator are only limited to the consumers willing to pay for the tenant's products/services without considering any other performance indicators. Informant A stated that

"To be sustainable, income needs to be sufficient to involve the much you need to sell to cover your expenditure. Since we are still new, it is enough to sell a product ..."

This incubator's specific target has not been determined, including how many tenants are predicted to be sustainable, problems that may arise, such as lack of programmers in the tenant's team, and difficulty creating reports with the same format non-technology-based businesses.

5) Impact

Incubators have evaluated the impact of the incubation process limited to evaluating tenant satisfaction. The limited assessment is due to the startup sector dynamic that makes it difficult to measure how far the incubator affects tenant's sustainability, as stated by informant A.

"We only have a satisfaction questionnaire, not a measurement. The measurement is still abstract, and we learned how dynamic the sector is because it keeps fluctuating"

Incubators still face some challenges in establishing specific criteria for the assessment of the incubation process's impact.

Measurement of impact is usually performed by examining the incubator's success. According to Somsuk & Laosirihongthong (2014), assessment is shown by the resources, such as organization, technology, financial and human. In this study, the impact is devoted to the assessment framework. This incubator has not conducted the impact measurement that is under ideal conditions, where scoring is not only limited to the success of a business after incubation but the sustainability of the program, the growth of startups, and the contributions made to both universities and the wider environment (Gozali et al., 2015).

Based on data analysis, some ideal conditions and challenges can be developed. Table 3

shows a summary of ideal conditions and challenges.

Table 3.
Ideal Conditions and Challenges

Stages	Ideal Conditions	Challenges	References
Pre-Incubation	Criteria of tenant's acceptance consisting of aspects of desirability, feasibility (internal startup)	Criteria of tenant's acceptance did not consider aspects of viability and external.	Bank Indonesia (2006); Gerlach & Brem (2015); Vanderstraeten & Matthyssens (2012); Wiggins & Gibson, (2003)
	Conduct selection phase with a business plan, pitching and interview, and announcement	Not performing any training actions to see the tenant's team competency.	
Main Incubation	The learning program is carried out following the tenant's needs and focuses on business and technical mentoring.	Not performing effective learning such as interventional approaches.	Bank Indonesia (2006); Carvalho & Galina (2015); Gerlach & Brem (2015); Gozali et al. (2015); Hillemane et al. (2019); Lalkaka (2006); Ratinho et al. (2013); Vanderstraeten & Matthyssens (2012); Van Weele et al. (2017); Wiggins & Gibson (2003)
	Sharing programs already running is seen as mentoring with flexible time and place.	Not implementing the coaching program for the tenants to be independent and not relying entirely on mentors.	
	There are already seminar and workshop programs.	Seminar and workshop programs have not been consistently conducted, and the frequency needs to be increased.	
	PPBT program assisted funding from Kementerian Riset dan Teknologi / Badan Riset dan Inovasi Nasional Republik Indonesia	The funding is still limited to grants from government agencies. There is no network with angel investors, private institutions, or industry.	
	Establishing a network with a running event in the university environment	Networking is still limited under the college and has not been expanded to the university's external environment.	
	Physical and non-physical facilities with the rental system are ideal.	-	
Post-Incubation	Graduation based on the incubation period is set more efficiently.	Graduation criteria limited to MoU, need to develop graduation criteria for tenants.	Bank Indonesia (2006); Carvalho & Galina (2015); Gerlach & Brem (2015); Gozali et al. (2015); Jamil et al. (2015); Lai & Lin (2015);
	Networking in the form of events and commercialization support the graduated tenants.	There are no mentoring or coaching services for tenants who have graduated.	

Stages	Ideal Conditions	Challenges	References
	Physical and non-physical facilities can be rented by tenants who have passed the incubator.	Accessible facilities are still limited and still depended on the management's policy.	Somsuk & Laosirihongthong (2014)
	There are already sustainable startups, shown by the consumers willing to buy their products/services from the graduated tenant.	a. Specific target has not been identified, like how many tenants predicted to be sustainable. b. Sustainable startup's criteria can still be further developed.	
	Evaluation of the incubation process's impact is carried out through surveys on tenant's satisfaction in the incubator.	Have not performed the evaluation, which includes the sustainability of the program, the growth of startups, as well as contributions made to the university/wider environment	

The implementation of the learning process has met the ideal conditions, such as the criteria for receiving tenants at the pre-incubation stage; the availability of physical and non-physical facilities, seminar programs, mentoring, networking, funding main incubation stage, graduation based on incubation period, networking, rentable facilities, and evaluation of the tenant's satisfaction impact on post-incubation stage.

It can be challenging for the tenants to raise many opportunities in development. This is because of the limited capacity and capability of the management team. The following are some of the challenges that incubator managers need to overcome.

- a. Assessment of viability aspects and external factors of a startup in the pre-incubation stage.
- b. Organizing coaching programs in the main incubation stage.
- c. Improving the consistency of seminars/workshops in the main incubation stage.
- d. Expanding access to funding and networking in the main incubation stage.
- e. Developing graduation criteria.
- f. Mentoring/coaching services for graduated tenants.

- g. Accessible facilities for graduated tenants (terms & conditions apply).
- h. Specific impacts measurement needs to be developed for the post-incubation stage.

5. Conclusions

Technology Business Incubator runs the learning process for startups in three stages, including pre-incubation, main incubation, and post-incubation. These three stages are expected to be carried out regularly every year. The question regarding “the management team's experience during the pre-incubation process of tenants in Technology Business Incubator?” is reflected in the main findings. During pre-incubation, the management team selects the startup with several stages and requirements. The tenant's admission target is based on the university's policy. The registrants accepted for incubation relate to the management team's capacity and capability.

The second question regarding “the programs and facilities during the main incubation and post-incubation process in Technology Business Incubator” is answered in different findings. The incubator provides tenants with a learning program, mentoring, seminar &

workshop, funding support, and networking during main incubation. The tenants may access the free facilities during the two years (terms and conditions apply), including office space, meeting room, internet access, and other office infrastructures. After completing the incubation process, only a networking program, such as an event, is offered to the tenants. Any programs and access for facilities after the post-incubation process are not provided.

The third question regarding “the management team's experience during the post-incubation process of tenants in Technology Business Incubator?” is reflected in the main findings. During the post-incubation process, the management team evaluates the incubation process's impact limited to tenant satisfaction. A specific target, such as how many tenants are predicted to be sustainable, is not determined. According to their evaluation, three sustainable startups already complete the incubation process.

These findings have academic and practical contributions. For instance, the academic contribution of interview guidelines used in this study can reference similar future research. Furthermore, these findings provide a comprehensive analysis to fill the literature gap. The study integrates various elements from the pre-incubation, main incubation, and post-incubation process. The practical contribution for business technology incubator involves providing an overview of the learning process implementation in the startup incubation period as a guide to improving tenant's incubation services.

This preliminary study focused on learning process evaluation using a qualitative approach. Evaluation of the learning process effectiveness in the incubator opens the opportunity for research with mixed methods. The aspects that influence measurements, such as the number of employees absorption in each startup, the economic impact on society, and the effect on the environment, can be integrated with quantitative data collection to obtain more in-depth results.

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APPENDIX

Table 1.
Interview Questions Guidelines

No.	Attribute	Interview Questions	Informants	Expected Results
1. Pre-Incubation Process				
1	Criteria	What are the specific criteria for tenant selection?	Top Management	The informants explain the criteria applied when they have to select tenants.
		Why does the incubator set specific criteria for the tenants' selection?	Top Management	The informants explain the reasons for determining specific criteria to select tenants.
		Who is involved in establishing the criteria for tenants' selection?	Top Management	The informants explain the stakeholders establishing the criteria of selection.
2	Stages	What are the stages of selecting the tenants?	Top Management	The informants explain the stages that occur in the tenants' selection process.
		Why are those stages applied in this business incubation?	Top Management	The informants explain the reasons why using several stages to select the tenants.
		When the time to select the tenants within one year?	Top Management	The informants explained the time when they held tenants' selection within one year.
		Where is the tenants' selection process carried out?	Top Management	The informants explain the place where to select the tenants.
		Who is involving in the tenants' selection process?	Top Management	The informants explain the stakeholders involve in the tenants' selection process.
		Are there any obstacles in the tenants' selection process? If any, what kinds of obstacles are usually faced in the tenant selection process?	Top Management	The informants explain the obstacles faced in the tenants' selection process and the solutions to handle it.
		How does the incubator handle it?		
3	Number of Registrants	How many registrants follow the selection process?	Top Management	The informants explain the average number of registrants during the selection process.
	Percentage of Registrants	What percentage of the registrants pass the selection process?	Top Management	The informants explain the percentage of the registrants that pass the selection process and continues to main incubation.
4	Target	Does this business incubation set the target of registrants or tenants to be incubated in each selection?	Top Management	The informants explain the target of tenants to be incubated in each selection.
		Why does this business incubation set the specific number of registrants or tenants to be incubated in each selection?	Top Management	The informants explain the reasons for setting the the target number of registrants or incubated tenants

No.	Attribute	Interview Questions	Informants	Expected Results
2. Main Incubation Process				
1	Learning program (curriculum/learning module)	How is the general/specific learning program conducted during the incubation process? Why is that kind of learning program conducted in the business incubator? When did these learning programs begin in the incubation process? Where is the learning program implemented? Who is involved in implementing the learning program in the business incubator? What kinds of obstacles are usually faced in the learning process? How do you handle it?	Top Management and Tenants Top Management Top Management and Tenants Top Management and Tenants Top Management and Tenants	The informants explain the learning program carried out by the business incubator. The informants explain the reasons for determining the learning program in the business incubator. The informants explain the time to start particular learning programs in the incubation process. The informants explain the place where to implement the learning programs. The informants explain the stakeholders involved in implementing the learning program in the business incubator. The informants explain the obstacles faced when implementing the learning programs and the solutions to handle them.
2	Sharing (Mentoring & Coaching)	How is the mentoring and coaching program conducted in the incubation process? Why was the mentoring and coaching program carried out? When was the mentoring and coaching program carried out? Where the mentoring and the coaching program is carried out Who are involving in the mentoring and coaching program? What obstacles do you usually face in mentoring and coaching programs? How do you handle it?	Top Management and Tenants Top Management Top Management and Tenants Top Management and Tenants Top Management and Tenants Top Management and Tenants	The informants explain how the business incubator conducts the mentoring and coaching programs. The informants explain the reasons for the mentoring and coaching program conducted by the incubator. The informants explain the time to implement the mentoring and coaching program. The informants explain the place where the mentoring and a mentor/coach carries out the coaching program. The informants explain the stakeholders involved in mentoring and coaching programs. The informants explain the obstacles faced in mentoring and coaching programs and the solutions to handle them.
3	Seminar	How is the seminar conducted in the incubation process? Why was the seminar conducted? When was the seminar carried out?	Top Management and Tenants Top Management Top Management and Tenants	The informants explain how business incubators are carried out in the seminar. The informants explain the reasons for the seminar carried out by the incubator. The informants explain the time to implement the seminar.

No.	Attribute	Interview Questions	Informants	Expected Results
4	Workshop	Where is the seminar carried out?	Top Management and Tenants	The informants explain the place where the mentor/coach conducts the seminar.
		Who is involved in the seminar?	Top Management and Tenants	The informants explain the stakeholders involved in the seminar.
		What obstacles do you usually face in the seminar program? How do you handle it?	Top Management and Tenants	The informants explain the obstacles faced in the seminar and the solutions to them.
		How is the workshop conducted in the incubation process?	Top Management and Tenants	The informants explain how business incubators are carried out in the workshop.
		Why was the workshop being carried out?	Top Management	The informants explain the reasons for the workshop being carried out by the incubator.
		When was the workshop carried out?	Top Management and Tenants	The informants explain the time to implement the workshop.
		Where was the workshop carried out?	Top Management and Tenants	The informants explain the place where the mentor/coach carries out the workshop.
		Who is involved in the workshop?	Top Management and Tenants	The informants explain the stakeholders involved in the workshop.
		What obstacles do you usually face in the workshop program? How do you handle it?	Top Management and Tenants	The informants explain the obstacles faced in the workshop and the solutions to them.
		How is the funding program implementation scheme provided in the incubation process?	Top Management and Tenants	The informants explain how the funding program implementation scheme and funding source are provided within the incubator.
5	Funding	Why is the funding program provided?	Top Management	The informants explain the reasons for the funding program provided by the incubator.
		When is the funding program conducted?	Top Management and Tenants	The informants explain the time the funding program was conducted.
		Who provides funding for the incubation process?	Top Management and Tenants	The informants explain the stakeholders involved in the funding program.
		What kind of obstacles do you usually face in funding programs? How do you handle it?	Top Management and Tenants	The informants explain the obstacles faced in the funding program and the solutions to handle them.
6	Networking	How is the implementation of the networking program given in the incubation stage? Is it a reactive or an anticipatory program?	Top Management and Tenants	The informants explain how the networking program is provided within the incubator.
		Why is the networking program given in the incubation stage?	Top Management	The informants explain the reasons for the networking program provided by the incubator.
		When will the networking program be given in the incubation stage?	Top Management and Tenants	The informants explain the time the networking program was conducted.
		Who is involved in the networking program at the incubation stage?	Top Management and Tenants	The informants explain the stakeholders involved in the networking program.

No.	Attribute	Interview Questions	Informants	Expected Results	
7	Physical Facilities	What kind of obstacles do you usually face in a networking program? How do you handle it?	Top Management and Tenants	The informants explain the obstacles faced in networking programs and the solutions to them.	
		What kind of physical facilities are provided in the incubation stage?	Top Management and Tenants	The informants explain the kinds of physical facilities provided in the incubation process.	
		What is the procedure for using the physical facilities provided in the incubation stage?	Top Management and Tenants	The informants explain the procedure for using the physical facilities provided in the incubation stage.	
		Why are these physical facilities provided in the incubation stage in this digital era?	Top Management	The informants explain the reasons for the physical facilities provided by the incubator.	
		When can tenants use the physical facilities provided in the incubation stage?	Top Management and Tenants	The informants explain the time the physical facilities can be accessed.	
		Who provides the physical facilities in the incubation stage?	Top Management and Tenants	The informants explain the stakeholders involved in physical facilities issues.	
		What kind of obstacles do you usually face in physical facilities? How do you handle them?	Top Management and Tenants	The informants explain the obstacles faced in physical facilities and the solutions to them.	
8	Non-Physical Facilities (wifi, servers, etc.)	What kind of non-physical facilities are provided in the incubation stage?	Top Management and Tenants	The informants explain the kinds of non-physical facilities provided in the incubation process.	
		What is the procedure for using the non-physical facilities provided in the incubation stage?	Top Management and Tenants	The informants explain the procedure for using the non-physical facilities provided in the incubation stage.	
		Why are these non-physical facilities provided in the incubation stage in this digital era?	Top Management	The informants explain the reasons for the non-physical facilities provided by the incubator.	
		When can tenants use the non-physical facilities provided in the incubation stage?	Top Management and Tenants	The informants explain the time when the non-physical facilities can be accessed.	
		Who provides the non-physical facilities in the incubation stage?	Top Management and Tenants	The informants explain the stakeholders involved in non-physical facilities issues.	
		What kind of obstacles do you usually face in non-physical facilities? How do you handle them?	Top Management and Tenants	The informants explain the obstacles faced in non-physical facilities and the solutions to them.	
3. Post-Incubation Process					
1	Proof of Graduation	Is there evidence after tenants complete the incubation activity?	Top Management and Tenants	The informants explain the evidence of participation in the incubation activity.	
		Are there any graduation criteria for tenants?	Top Management	The informants explain graduation criteria for tenants.	
		Which stakeholder issued the proof of graduation?	Top Management	The informants explain the division that issued proof of graduation.	

No.	Attribute	Interview Questions	Informants	Expected Results
2	Program	When is the proof of graduation issued?	Top Management and Tenants	The informants explain the time the incubator issue the proof of graduation
		What kind of program is carried out at the post-incubation stage?	Top Management and Tenants	Informants explain the programs that take place after the tenant has completed the incubation program.
		Are there any programs such as seminars, workshops, or sharing sessions conducted by incubators for tenants who have graduated?	Top Management and Tenants	The informants explain the programs, such as learning or empowerment in seminars, workshops, or sharing sessions conducted by tenants.
		Why was the program still carried out for the alumni?	Top Management	The informants explain the reasons, goals, and benefits of the program carried out for alumni.
		Who is involved in the program for alumni?	Top Management and Tenants	The informants explain the stakeholders involved in the program for alumni.
3	Facilities	Can the program for alumni be accessed anytime?	Top Management and Tenants	The informants explain the time limit when accessing the program.
		What kind of facilities is provided at the post-incubation stage?	Top Management and Tenants	Informants explain the facilities accessed after the tenant has completed the incubation program.
		Why were the facilities still provided for the alumni?	Top Management	The informants explain the reasons, goals, and benefits of the facilities provided for alumni.
		Who is involved in the facilities for alumni?	Top Management and Tenants	The informants explain the stakeholders involved in the facilities for alumni.
		Are the facilities for alumni accessed anytime?	Top Management and Tenants	The informants explain the time limit when accessing the facilities.
4	Target of Sustainability	How many tenants are targeting to be sustainable after graduation?	Top Management	The informants explain the target number of startups that are directly absorbed by the market at each graduation.
		Do the current sustainable startups meet the incubator's expectations? How does the incubator overcome these obstacles?	Top Management	The informants explain whether the sustainable startups have met the incubator's expectations or not. They also explain the obstacles (if any) and solutions to them.
5	Impact	What is the kind of measurement for alumni?	Top Management	The informants explain the measurement regularly conducted by the alumni, such as the number of employee absorption, the social impact, and the economic impact.
		Who is responsible for conducting the measurement for alumni?	Top Management	The informants explain the stakeholders responsible for conducting the measurement.
		Why does an incubator use this kind of assessment for alumni?	Top Management	The informants explain the reasons why they use the specific measurement for alumni.
		When was the measurement for alumni carried out?	Top Management	The informants explain the time when the measurement for

No.	Attribute	Interview Questions	Informants	Expected Results
		What are the impacts after tenants complete the incubation process?	Top Management	alumni was conducted. The informants explain the tenants' impact after completing the incubation. This includes economic, social, and environmental impacts.