

Is the Performance of the Legal Entity State University Business Incubator (PTN-BH) in Indonesia Good?

Apakah Kinerja dari Inkubator Bisnis Perguruan Tinggi Negeri Berbadan Hukum (PTN-BH) di Indonesia Baik?

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ABSTRACT

Indonesia's innovation management focuses on enhancing competitiveness, independence, and economy through research and development, with university-based business incubators connecting research and commercialization. Three public incubators have an A rating, indicating an 86 percent survival rate. This research aims to explore the level of efficiency of business incubator performance, and level of tenant satisfaction, and classify business incubator services into different levels of satisfaction/dissatisfaction through a satisfaction matrix. The research employs a quantitative method, utilizing a Paired Sample t-test and IPA (Importance Performance Analysis) matrix. The results show that job creation (on average per year) exceeds the benchmarking value, so it can be said that the public universities' business incubator has contributed to job creation. There are differences in all variables for the level of effectiveness and importance which have negative values or tenants feel dissatisfied with the services provided by the business incubator, business incubator services that need attention are IP protection and startup legal, exhibitions and business matching with investors or potential partners, business network support after graduation and business expansion assistance after graduation.

Keywords: Business incubator, networks, performance, startup, tenant satisfaction.

ABSTRAK

Manajemen inovasi di Indonesia berfokus pada peningkatan daya saing, kemandirian, dan perekonomian melalui penelitian dan pengembangan, dengan inkubator bisnis berbasis universitas yang menghubungkan penelitian dan komersialisasi. Tiga inkubator publik memiliki peringkat A, yang menunjukkan tingkat kelangsungan hidup sebesar 86 persen. Penelitian ini bertujuan untuk mengeksplorasi tingkat efisiensi kinerja inkubator bisnis, tingkat kepuasan penyewa, dan mengklasifikasikan layanan inkubator bisnis ke dalam berbagai tingkat kepuasan/ketidakpuasan melalui matriks kepuasan. Penelitian ini menggunakan metode kuantitatif dengan menggunakan uji Paired Sample t-test dan matriks IPA (*Importance Performance Analysis*). Hasilnya menunjukkan penciptaan lapangan kerja (rata-rata per tahun) melebihi nilai benchmarking, sehingga dapat dikatakan inkubator bisnis PTN-BH telah berkontribusi terhadap penciptaan lapangan kerja. Terdapat perbedaan seluruh variabel untuk tingkat efektivitas dan kepentingan yang bernilai negatif atau penyewa merasa tidak puas dengan pelayanan yang diberikan oleh inkubator bisnis, dan layanan inkubator bisnis yang perlu mendapat perhatian adalah perlindungan HKI dan legal startup, pameran dan pencocokan bisnis dengan investor atau calon mitra, dukungan jaringan usaha setelah lulus dan bantuan perluasan usaha setelah lulus.

Kata kunci: Inkubator bisnis, jaringan, kepuasan tenan, kinerja, *startup*.

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INTRODUCTION

One of the objectives of innovation management, as stated in Indonesia's Permenristekdikti No. 24 of 2019 concerning higher education innovation management, is to promote the implementation and utilization of research and development results. These results are applied and produced by universities and contain elements of novelty, aimed at increasing competitiveness, independence, economy, and the welfare of the country (Kemenristekdikti, 2019). According to Law No. 7 of 2021, one method of implementing innovation management services is entrepreneurial incubation, which aims to maximize the use of educated human resources in advancing the economy through the application of science and technology. Due to the numerous services it offers, business incubation is seen as a catalyst for the sustainable development of new businesses (Meru & Struwig, 2011). By providing startups with access to resources, mentoring, and networking opportunities, business incubators can help entrepreneurs develop their skills, refine their business models, and build sustainable enterprises (Annas & Meilinda, 2023). This, in turn, can lead to job creation, innovation, and economic growth in the local community.

Business incubators can also support the development of sustainable businesses that prioritize social and environmental impact, as well as profit (Pattanasak *et al.*, 2022). Many incubators now offer programs specifically focused on social entrepreneurship or green technology, which can help startups create businesses that address important social and environmental challenges. As seen in Table 1, there are many different kinds of business incubators, with university-based ones being the most significant (Wann *et al.*, 2017).

Table 1. Business Incubator Data in Indonesia

Information	Total
Member of AIBI (Association of Indonesian Business Incubators)	139
• University incubator	112
• Private incubator	10
• Government incubator	17
Received a facilitation grant from the Ministry of Research, Technology and Higher Education 2017-2019	78
Get Accreditation	13
A Accreditation	8
B Accreditation	2
C Accreditation	3

University business incubators serve as a link between research and commercialization, making it easier for technology companies to access the intellectual property (Zavatta, 2008). Moreover, a university business incubator is an institution created to hasten the growth and development of startups, particularly those in the technology sector, by providing them with physical premises as well as a range of tools and services that will boost their chances of survival rate (Somsuk & Laosirihongthong, 2014).

Following are statistics on tenant survival rates from three public universities' business incubators that have earned an A rating, as shown in Figure 1: IPB, UI, and ITS. The suggested survival rate is 86 percent, of Research, Technology, and Higher Education, the three business incubators mentioned above all obtained scores below 86 percent. According to a survey conducted in June 2020 by the Ministry of Research,

Technology, and Higher Education, out of the 661 Technology-Based Startup companies that have received funding since 2015, 431 are still operating, resulting in a survival rate of 65 percent.

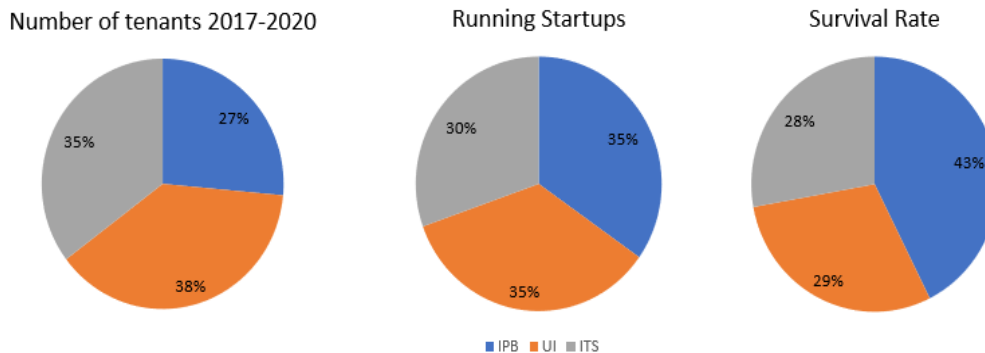


Figure 1. Data of survival rate

Although business incubators are a part of the Technology-Based Startup funding program, they are also required to help entrepreneurs in addition to serving as a point of contact between them and the Ministry of Research, Technology and Higher Education. This raises questions such as: (1) What is the level of performance efficiency of each incubator business; (2) Are tenants satisfied with the services provided by the business incubator; and (3) How are business incubator services classified into different levels of satisfaction/dissatisfaction through the satisfaction matrix.

A significant discovery highlighted in the paper is that the performance of business incubators is positively influenced by factors such as information technology, entry requirements, government backing and safeguards, financial assistance, mentoring, networking, and supportive university regulations (Gozali, *et al.*, 2020). Additionally, there is limited research on the subject of consumer satisfaction with the assistance services offered by incubators (Hartog *et al.*, 2018). Moreover, Abduh *et al.* (2007) note that little is known about the benefits of business incubation programs from the viewpoint of tenants beyond the mere implementation of these programs.

It may be stated that there is a study gap on how tenants perceive the efficacy of the business incubation services offered and the concerning low survival rate of business incubators. In light of this, the present study aims to shed light on the extent to which the university prioritizes the development of its students' entrepreneurial skills. Moreover, it seeks to explore whether tenants or startups approve of the services offered by the business incubator and how their satisfaction aligns with a satisfaction matrix. The research also aims to determine the effectiveness of business incubators and gather tenant opinions on the significance, effectiveness, and influence of incubation programs on the growth of their companies. Conducting research on the effectiveness of business incubators and evaluating their services from the tenants' perspective, both of which have not been previously done in Indonesia, has the potential to offer novel insights. Furthermore, the study aims to fill in the gaps in the literature concerning the assessment of business incubator performance.

Literature Review

Business Incubator Performance Evaluation

A Business Incubator can be defined as an intermediary organisation that facilitates the incubation process for individuals or organisations participating in the incubation programme, commonly referred to as tenants. The primary objective of

business incubators is to foster the creation and growth of novel enterprises that possess economic viability and a strong competitive edge. Additionally, these incubators strive to maximise the utilisation of skilled human capital in driving economic progress through the effective application of scientific knowledge and technological advancements. The objective of establishing business incubators is to enhance the growth and bolster the capabilities of startup enterprises that exhibit great competitiveness and possess significant economic worth. The operational framework of business incubators, as outlined in Public Policy Number 7 of 2021, encompasses three distinct phases: pre-incubation, incubation, and post-incubation activities.

In evaluating the performance of public university business incubators in Indonesia, the theory of innovation systems provides a comprehensive framework. This theory, rooted in the understanding that business incubators function as complex systems, emphasizes the interplay between various interconnected components. The innovation systems theory is particularly relevant as it allows for the examination of the incubator as a system, considering elements such as management, facilities, human resources, and networks. Moreover, it underscores the role of incubators as catalysts for innovation and business growth, aligning with the incubators' objectives (Satalkina & Steiner, 2020). By employing this theory, the evaluation of business incubator performance extends beyond operational efficiency, delving into their contribution to fostering a culture of innovation, facilitating technology transfer, and promoting regional economic development. This holistic approach ensures a nuanced assessment of public university business incubators, encompassing their multifaceted impact on entrepreneurship, innovation, and the broader socio-economic landscape.

University Business Incubator

As educational establishments, universities play a crucial role in fostering technological advancement, providing opportunity for aspiring entrepreneurs, and serving as a source of research. Teaching, research, technological transfer, community service, and the commercialization of research findings are among the responsibilities of the university. Universities now have a more difficult role to play in the creation of new businesses, or startups, as well as in the transfer of intellectual property created by university faculty to the private sector. This is due to the rise of business incubators. According to Somsuk and Laosirihongthong (2014), university business incubators are institutions within universities that are explicitly created to support start-up businesses, particularly those that are rooted in technology, as they grow and expand. This helps to expedite the country's economic development. Another tactic to encourage the growth of new technology- or research-based businesses is the employment of business incubators (Mian, 1996). Furthermore, university business incubators differ from other public or private incubators in that the former primarily concentrate on renting out space to tenants, while the latter infrequently offer tenants additional guidance or assistance. They solely care about the incubator's revenues and have less ties to the university's resources and services. The university business incubator offers a range of services in addition to physical workspaces to support tenants' early-stage capacities. Tenants can obtain additional value through capital investment and access to investors and venture capital thanks to the incubator's services (Ayatse *et al.*, 2017).

Tenant

According to Presidential Regulation No. 27 of 2013 on the Development of Entrepreneurial Incubators, those referred to as tenants or incubation participants are entrepreneurs or aspiring entrepreneurs who are currently engaged in the incubation

process. Prospective tenants seeking participation in the incubation programme are required to successfully through a selection process administered by the business incubator.

Startup

Startups refer to emerging business enterprises that face challenges in establishing their presence and are recognised as highly proficient catalysts in generating novel concepts. Startups typically originate from innovative concepts and progress towards attaining prosperity (Salamzadeh, 2015).

Tenant Satisfaction with Business Incubator Services

The assessment of incubation services, as perceived by clients or tenants, is a crucial factor in evaluating the quality of services offered by the incubator. This evaluation also helps determine the overall effectiveness and efficiency of the business incubation programme being given (Abduh *et al.*, 2007). In order to gain a deeper understanding of tenants' perspectives on the business incubation programme, this study categorises the evaluated incubator services into four primary groups: facilities and infrastructure, business support, financial support, and post-graduation services. The aim is to assess the tenants' perceptions regarding the significance, efficacy, and satisfaction levels of the business support services offered by their respective business incubators.

Previous research discussing the level of tenant satisfaction with business incubator services has been conducted by Abduh *et al.* (2007) and Meru & Struwig (2011). Abduh *et al.* (2007) aimed to demonstrate that business incubation programs provided by business incubators are strategies for developing new companies with the goal of accelerating the formation, development, sustainability, and growth of these new firms (tenants) by offering various business assistance, including physical facilities, business counseling, and networking. The study by Abduh *et al.* (2007) presented research results to assess the level of satisfaction/dissatisfaction of clients or tenants regarding the provision of these support services, which were calculated by comparing the average importance of each service with the effectiveness of the incubator's management in providing them. The results showed that tenants generally were more satisfied with services related to facilities than counseling and business networking assistance.

Meru and Struwig (2011) also conducted a similar study to Abduh *et al.* (2007) to understand the perception of the importance of business incubation processes and how tenants viewed the services they received. The method used also involved calculating the average difference, and the results indicated a gap between how tenants perceived the business incubation process (services) and what they actually received.

In examining the tenant satisfaction with business incubator services in public universities in Indonesia, the grand theory of Service Quality provides a pertinent framework. Rooted in marketing and management studies, Service Quality theory underscores the significance of meeting or exceeding tenant expectations in various dimensions. This theory considers factors such as tangibility, reliability, responsiveness, assurance, and empathy, which collectively contribute to the overall service quality (Abduh *et al.*, 2007). In the context of business incubators, tenant satisfaction becomes a crucial indicator of performance, reflecting the effectiveness of the incubator in providing essential support, mentorship, and resources to emerging businesses. This approach ensures an understanding of the tenants' perspectives, allowing for targeted

improvements in incubator services and ultimately enhancing overall performance and satisfaction levels.

Classification of Business Incubator Services

In analyzing the services of public university business incubators in Indonesia and organizing them based on tenant satisfaction, we can employ the concept of customer satisfaction. This concept suggests that understanding and meeting customer expectations are crucial for effective service delivery. Using a satisfaction matrix aligns with this theory, allowing us to categorize services based on how satisfied tenants are (Abduh *et al.*, 2007). This approach simplifies the evaluation process by focusing on the aspects that matter most to the tenants, helping incubators enhance their services for better performance and to better serve the needs of entrepreneurs.

Hypothesis

Based on what Pattanasak *et al.* (2022), the success and performance of business incubators in public universities in Indonesia are influenced by a comprehensive interplay of factors, including technological infrastructure, well-defined entry criteria, active government support and protection, adequate funding mechanisms, effective mentoring networks, and supportive university regulations. Beneath are the hypotheses that might be suit. The substantial support from factors such as information technology, entry criteria, government support and protection, funding, mentoring networking, and university regulations can enhance the performance of business incubators in public universities in Indonesia.

The study by Abduh *et al.* (2007) presents the findings of research conducted to determine the level of satisfaction/dissatisfaction of clients or tenants regarding the provision of assistance services. The results of Abduh *et al.* (2007) study indicate that tenants are generally more satisfied with facility-related services than counseling and business networking assistance. On the other hand, Meru and Struwig (2011) show that there is a gap between how tenants perceive the business incubation process (services) and what they actually receive. The hypothesis in knowing tenant satisfaction with business incubator services is there is difference in averages between the importance of services and the effectiveness of incubator management in providing each service (Abduh *et al.*, 2007).

RESEARCH METHODS

The objects of this research are business incubators and their tenants (startups) in 10 public universities in Indonesia, namely Bandung Institute of Technology (ITB), Sepuluh Nopember Institute of Technology (ITS), Bogor Agricultural Institute (IPB), Gadjah Mada University (UGM), University of Indonesia (UI), Padjadjaran University (Unpad), Airlangga University (Unair), North Sumatra University (USU), Sebelas Maret University (UNS), and Hasanuddin University (Unhas). The research period starts from September 2021 to November 2022, with a total of 75 startups participating in the survey. In this study, the business incubators fill the performance form and the tenants were instructed to fill in the questionnaire with the corresponding numerical values that best represented their opinions about their satisfaction. The research framework could be describing as below:

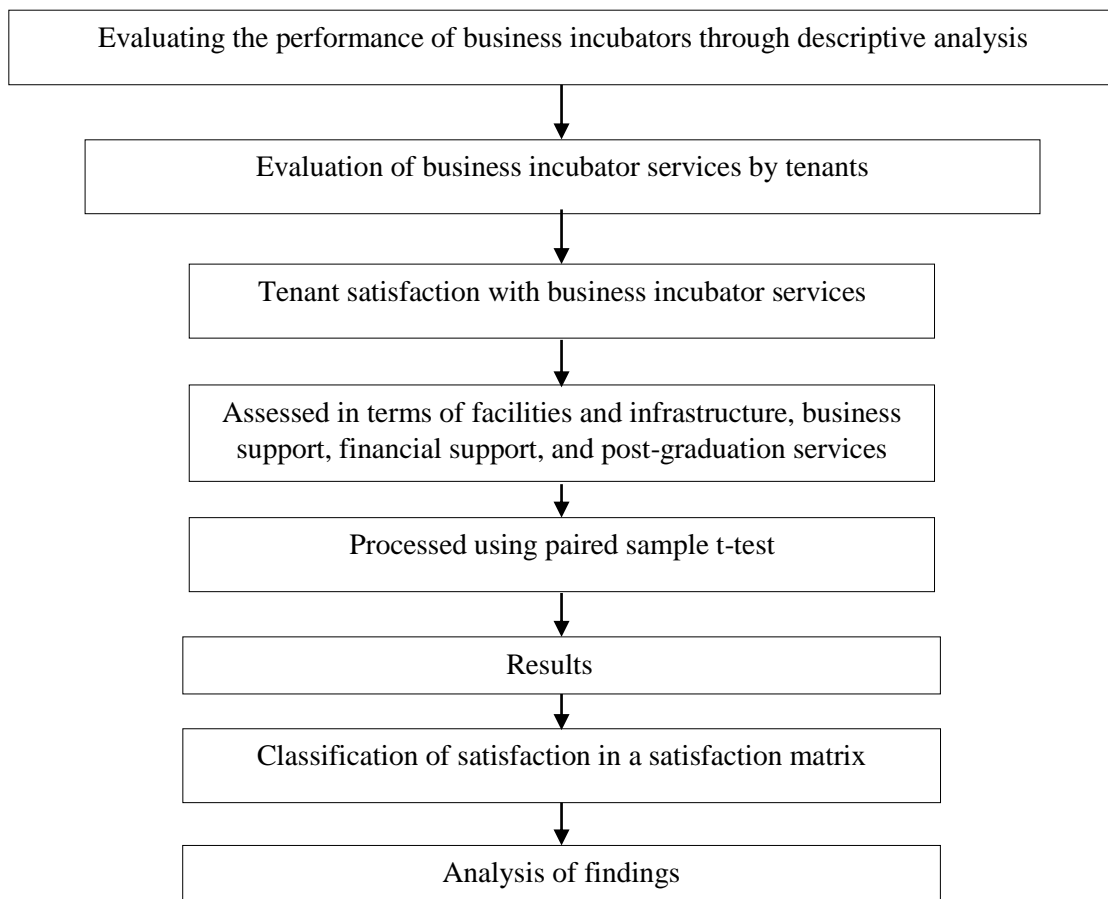


Figure 2. Research Framework

The data used in this study are primary and secondary data. Primary data is data obtained from business incubators and assisted tenants at 10 public universities by filling out questionnaires online. The collected data will be processed into quantitative data. Meanwhile, secondary data is data obtained and collected from literature studies, previous research, articles, journals and the internet. This study used a purposive sampling technique, namely the technique of determining the sample with certain criteria. The first criterion is that business incubators and tenants come from public university, the second criterion is that the business incubator has received a business incubator institutional development facilitation grant from the Ministry of Research, Technology and Higher Education in 2017-2019, the third criterion is that tenants join the business incubator in 2017-2020 (because there are indicators regarding service after passing the business incubation, so tenants who joined in 2017-2020 can be said to have passed the incubation period and can fill out a questionnaire).

The variable for measuring performance of business incubator can be analyzed by the descriptive analysis. Paired sample t-tests were conducted using SPSS to determine statistical differences between the importance and effectiveness of individual and overall services provided by the incubator based on what the client perceives. The significance level was set at the 5 percent level (Abduh *et al.*, 2007). The satisfaction matrix describes the level of tenant satisfaction or dissatisfaction with the provision of incubator services individually.

RESULTS AND DISCUSSION

Business Incubator Performance Evaluation

The assessment of business incubator effectiveness through a descriptive approach entails the gathering of data and the depiction of the attributes of the incubator, its occupants, and the results of the incubation process. The descriptive approach does not encompass statistical analysis or hypothesis testing. Instead, it concentrates on providing a clear and simple depiction of the data's properties. Nevertheless, it is important to acknowledge that the descriptive method lacks the ability to offer a causal elucidation of the connections between variables. Consequently, additional investigation may be necessary in order to demonstrate causality.

Assessing the efficacy of business incubator services via the lens of tenants is a crucial element in guaranteeing the effectiveness of such programmes. Business incubators can enhance their ability to assist the development of their tenant businesses by actively soliciting feedback and utilising it to make improvements to their services. The evaluation of business incubator efficiency can be conducted using the descriptive method by implementing the following steps:

This inquiry aims to identify the fundamental attributes of a business incubator. The aforementioned factors encompass the age of the incubator, the quantity of tenants, the range of services supplied, and the extent of support extended. This inquiry seeks to elucidate the defining attributes of the tenants. The aforementioned factors encompass the age range of the tenants, the specific industry sectors they are affiliated with, their respective levels of professional experience, as well as their aspirations for both personal and professional advancement. This report aims to document the outcomes of the incubation phase. This encompasses the tenants' survival rate, growth rate, employment creation, and overall success rate.

Table 2. Business Incubator Performance

Indicator	ITB	IPB	ITS	UI	UGM	Unpad	Unair	USU	UNS	Unhas	Average	
Professional Staff (tenant companion, coach, mentor)	10	13	8	8	15	6	6	3	19	6	9	
Business incubator managers (managers and staff)	1	2	1	3	8	5	3	3	2	5	3	
The year the business incubator was founded	2010	1994	2017	2007	2012	2003	2017	1997	1994	2016	2007	
Length of business incubation	12	36	12	12	6	12	12	36	6	36	18	
Occupancy ratio to incubator building												
Co-working space	14%	3%	29%	298%	57%	9%	26%	43%	2%	25%	51%	
Laboratory		2%	2%		18%		8%		17%	25%	8%	
Production room		38%	4%		14%		8%	7%	49%	38%	17%	
Other (please fill in)		14%	15%	214%	12%		8%	50%	46%	13%	41%	
Business incubator revenue (university, government, private)	-	1,58B	0,83B	1,49B	-	-	0,95B	0,60B	0,82B	0,77B	0,70B	
Job creation (annual average)	6	6	6	7	94	14	2	8	4	2	15	
Tenants who pass (graduate rate)	64%	61%	100%	77%	100%	100%	67%	0%	100%	2%	67%	
Passing tenant income (average per year)	21M	925M	626M	1,9B	151M	100M	292M	98M	-	107M	425M	

Indicator	ITB	IPB	ITS	UI	UGM	Unpad	Unair	USU	UNS	Unhas	Average
Incubated tenants	29	14	22	26	32	6	18	3	27	28	21
Tenants who continue the business (survival rate)	59%	72%	29%	44%	50%	0%	56%	50%	0%	77%	44%
Registered IP	2	3	4	7	2	0	4	3	2	8	3

Table 2 shows that Professional Staff (Number of accompanying tenants, coaches and mentors) has an average score of 9 with universities that have efficiency being IPB, UGM and UNS. Business incubator managers (managers and staff) have an average score of 3 with universities that have efficiency being UGM, Unpad, and Unhas. The average year the business incubator was founded was 2007 and the universities with the longest years of existence were IPB, USU, and UNS. The average length of business incubation is 18 and the universities taking the longest are IPB, USU, and Unhas.

The occupancy ratio for incubator buildings in the co-working space indicator has an average of 51 percent, laboratories have an average of 8 percent, production spaces have an average of 17 percent, and Others have an average of 41 percent. The average income of business incubators (universities, government, private) is 0,70B with the largest universities being IPB, UI and Unair. Job creation (average per year) has an average of 15 with the largest universities being UGM, Unpad, and USU. Tenants who graduate (graduate rate) have an average of 67 percent with the highest universities being ITS, UGM, Unpad, and UNS. The income of graduating tenants (average per year) has an average of 425 billion with the largest universities being IPB, ITS, and UI. The average number of tenants fostered is 21, with the largest number being at universities, namely ITB, UGM and Unhas. Tenants who continue business (survival rate) have an average of 44 percent with the largest number being at universities, namely ITB, IPB and Unhas. Registered IP has an average of 3 with the largest number being at universities, namely ITS, UI, Unair, and Unhas.

Table 3. Benchmarking

Indicator	Average	Benchmark	Suitable/ Not
Business incubator managers (managers and staff)	3	12	Not
Length of business incubation	18	30	Not
Business incubator revenue (university, government, private)	0,70B	5,11T	Not
Job creation (annual average)	15	4,6	Yes
Incubated tenants	21	35	Not
Tenants who continue the business (survival rate)	44%	86%	Not
Tenant/staff ratio	6	14	Not

Table 3 shows that based on a comparison of the performance assessment results of business incubators and their tenants (startups) in 10 public universities in Indonesia, namely Bandung Institute of Technology (ITB), Sepuluh Nopember Institute of Technology (ITS), Bogor Agricultural Institute (IPB), Gadjah Mada University (UGM), University of Indonesia (UI), Padjadjaran University (Unpad), Airlangga University (Unair), North Sumatra University (USU), Sebelas Maret University (UNS), and Hasanuddin University (Unhas) with the benchmarking concept by Torun *et al.* (2018) that of the 7 assessment indicators, only 1 indicator is suitable, namely job creation (annual average) and the other indicators are included in the inappropriate category.

According to Suwandi (2007), the incorporation of business incubators within universities holds significant promise in fostering the development of new entrepreneurs

through the implementation of the Business Incubator program, which serves as a manifestation of the Higher Education Dharma in the realms of research and community engagement. The activities stemming from research and community service endeavors are anticipated to facilitate the conversion of discoveries into innovative solutions, thereby instigating a process of value creation. This process, in turn, is expected to produce a favorable outcome, namely the commercialization of technology, which can effectively stimulate the generation and enhancement of societal wealth, encompassing both social wealth creation and social wealth improvement. Assessment results of business incubators and their tenants (startups) in 10 public universities in Indonesia show that only 1 indicator is suitable with the benchmarking concept by Torun *et al.* (2018). This shows that there is a need to improve performance so that other indicators can be appropriate.

The research results are in line with Agustina (2011) that the general problem that occurs in the management of university business incubators is the autonomous status of the business incubator and the limited time of the incubator manager, who in fact is a lecturer or researcher from the university concerned. Increasing business incubator managers (managers and staff) can be done by carrying out professional and effective business incubator management to ensure support from sponsors, evaluate business prospects, estimate developments and facilitate the transition period for tenants to complete their business incubation program. Viewed from the management aspect, in improving the Higher Education Business Incubator, it must be reviewed from the aspects of the number of full-time workers, incubator managers, experience and training of incubator management staff, as well as the ratio of accompanying staff. The presence of full-time staff greatly influences the performance of the Business Incubator because they will focus and have enough time to manage and developing Business Incubators, expanding networks, and developing capabilities as Business Incubator managers (Hasbullah *et al.*, 2015).

Tenants of business incubators can enhance their managerial abilities with the assistance of training and coaching. The main goals of these trainings are to promote originality, inventiveness, and proactiveness in the face of environmental changes. With its immediate benefits, the training is specifically designed for the business sector. Tenants are able to recognize problems at work and put their abilities into effect. Following training, they can be enhanced by placing people or groups in resource-based, small- to medium-sized enterprises for an apprenticeship. Tenants who receive coaching are better able to handle business-related issues while upholding the values of entrepreneurial management (Agustina, 2011). The goal of inter-institutional collaboration is to use strategic advantages for associated businesses to achieve a win-win solution (Suprihanti *et al.*, 2020). Three methods are used to guide the establishment of business units: structured consultancies, incidental consultancies, and mentorship. The business incubator has a role as an accompanying and intermediary institution that will help the SMEs (new entrepreneurs) who are being coached so that the risk of business failure can be minimized, gain market access, and support better product innovation (Firdaus *et al.*, 2023). Fadhlurahman (2019) stated success in implementing effective business-related entrepreneurship training in providing an understanding of improving product quality, business concepts, marketing and management, providing an understanding of entrepreneurial skills, as well as providing benefits to entrepreneurship training participants even for their own companies.

The results of the study support the hypothesis that various factors, including technological infrastructure, entry criteria, government support, funding mechanisms, mentoring networks, and university regulations, collectively influence the success and performance of business incubators in public universities in Indonesia.

Tenant Satisfaction with Business Incubator Services

Assessment of the level of tenant satisfaction with business incubator services seen from 75 public universities' startups with indicators of facilities and infrastructure, business support, financial support and services after graduation. The variables used to analyze the level of tenant satisfaction with business incubator services and to classify business incubator services into different levels of satisfaction/dissatisfaction through a satisfaction matrix (Meru & Struwig, 2011; Abduh *et al.*, 2007) are as follows:

- (1) Facilities and infrastructure are seen from complete office equipment and furniture, co-working space facilities, internet facilities and affordable (or free) rental fees;
- (2) Business support can be seen from regular training and workshops, business coaching and mentoring, legal support (IP protection and startup legal), business networking (exhibitions and business matching with investors or potential partners) and administrative support from business incubators;
- (3) Financial support is seen from access to financial institutions, funding (grants or capital) from business incubators and capital participation and profit sharing;
- (4) Services after graduation are seen from business network support after graduation, financial support after graduation and business expansion assistance.

The indicators in the variables above are measured using a comparison between importance and effectiveness. Importance was measured using a five-point scale where 1 represents "very unimportant", 2 represents "not important", 3 represents "somewhat important", 4 represents "important" and 5 represents "very important". Effectiveness was measured using a five-point scale where 1 represents "very ineffective", 2 represents "not effective", 3 represents "somewhat effective", 4 represents "effective" and 5 represents "very effective".

After the data was collected from distributing questionnaires, the researcher analyzed the data obtained using the Paired Sample t-test. Paired sample t-test was conducted using SPSS to determine statistical differences between the importance and effectiveness of individual and overall services provided by the incubator based on what was perceived by clients. The significance level was set at 5 percent (Abduh *et al.*, 2007).

Table 4. Paired Sample t-test result

		Mean	Mean Difference	Sig. (2-tailed)
Pair 1	X1.1 (Facilities and infrastructure; Complete office equipment and furniture) importance	4,19	-0,347	0,008
	X1.1 (Facilities and infrastructure; Complete office equipment and furniture) effectiveness	3,84		
Pair 2	X1.2 (Facilities and infrastructure; Co-working space facilities) importance	4,43	-0,533	<0,001
	X1.2 (Facilities and infrastructure; Co-working space facilities) effectiveness	3,89		

		Mean	Mean Difference	Sig. (2-tailed)
Pair 3	X1.3 (Facilities and infrastructure; Internet facilities) importance	4,72		
	X1.3 (Facilities and infrastructure; Internet facilities) effectiveness	3,99	-0,733	<0,001
Pair 4	X1.4 (Facilities and infrastructure; Affordable or free rental fees) importance	4,57		
	X1.4 (Facilities and infrastructure; Affordable or free rental fees) effectiveness	4,07	-0,507	<0,001
Pair 5	X2.1 (Business support; Regular training and workshops) importance	4,31		
	X2.1 (Business support; Regular training and workshops) effectiveness	3,79	-0,520	<0,001
Pair 6	X2.2 (Business support; Business coaching and mentoring) importance	4,43		
	X2.2 (Business support; Business coaching and mentoring) effectiveness	3,79	-0,640	<0,001
Pair 7	X2.3 (Business support; Legal support (IP protection and startup legal)) importance	4,56		
	X2.3 (Business support; Legal support (IP protection and startup legal)) effectiveness	3,68	-0,880	<0,001
Pair 8	X2.4 (Business support; Business networking (exhibitions and business matching with investors or potential partners)) importance	4,56		
	X2.4 (Business support; Business networking (exhibitions and business matching with investors or potential partners)) effectiveness	3,57	-0,987	<0,001
Pair 9	X2.5 (Business support; Administrative support from the business incubator) importance	4,28		
	X2.5 (Business support; Administrative support from the business incubator) effectiveness	3,67	-0,613	<0,001
Pair 10	X3.1 (Financial support; Access financial institutions) importance	4,12		
	X3.1 (Financial support; Access financial institutions) effectiveness	3,52	-0,600	<0,001
Pair 11	X3.2 (Financial support; Funding (grants or capital) from business incubators) importance	4,29		
	X3.2 (Financial support; Funding (grants or capital) from business incubators) effectiveness	3,83	-0,467	0,002
Pair 12	X3.3 (Financial support; Capital participation and profit sharing) importance	3,97		
	X3.3 (Financial support; Capital participation and profit sharing) effectiveness	3,35	-0,627	<0,001

		Mean	Mean Difference	Sig. (2-tailed)
Pair 13	X4.1 (Service after graduation; Business network support after graduation) importance	4,56		
	X4.1 (Service after graduation; Business network support after graduation) effectiveness		-0,907	<0,001
Pair 14	X4.2 (Service after graduation; Financial support after graduation) importance	4,16		
	X4.2 (Service after graduation; Financial support after graduation) effectiveness	3,44	-0,720	<0,001
Pair 15	X4.3 (Service after graduation; Business expansion assistance) importance	4,49		
	X4.3 (Service after graduation; Business expansion assistance) effectiveness	3,48	-1,013	<0,001

Table 4 shows that all are significant, meaning there is an average difference between importance and effectiveness. It supports the hypothesis above. A positive average value indicates that importance is still better than effectiveness. A significant value that has a negative average difference indicates a gap between importance and effectiveness, which means that tenant expectations have not been met by the business incubator. This negative value indicates dissatisfaction. The study's findings are consistent with that of Kristianingsih *et al.* (2017), who found that tenants had lower levels of satisfaction with university business incubators. Work networks have an impact on business incubator happiness, and tenant contentment in these spaces plays a role in that influence (Adlešič & Slavec, 2012). Consumers in a decision-making process will not end with the consumption phase; instead, they will proceed to evaluate the consumption they have already completed (Sumarwan, 2015).

Stakeholders, particularly higher education institutions, must pay close attention to improving the incubator finance system in the future. Universities have to see themselves as strategic partners with business incubators in developing, preparing, and promoting the expansion of start-up companies founded on cutting-edge technology inside the higher education sector. The development of innovation-based technology-based entrepreneurship must be made a strategic plan for higher education institutions, and they must carry it out by providing Business Incubator institutions with full assistance, particularly in the form of funds and facilities. Improvements must be made to the business incubator services because the total score is often influenced by the tenant satisfaction viewpoint scores (Hasbullah *et al.*, 2015). According to Marzaman & Hasan (2020), access to suitable financing institutions, efficient policies and regulations, and well-maintained infrastructure are all crucial supporting elements in the development of tenants through Business Incubators.

Business incubators serve as essential catalysts for entrepreneurial success by offering startups valuable resources, encompassing financial support, infrastructure, and necessary tools. Additionally, the provision of mentoring within the incubator ecosystem becomes a key component in honing the skills of entrepreneurs. The mentorship programs contribute to the development of managerial abilities, problem-solving skills, and a deeper understanding of industry dynamics. Moreover, the

networking opportunities facilitated by business incubators play a critical role in connecting startups with industry experts, potential collaborators, and investors such what Annas & Meilinda (2003) says, these connections not only provide startups with market access but also foster an environment conducive to innovation and knowledge exchange. As a result of these multifaceted support mechanisms, entrepreneurs within business incubators can refine their business models, adapting them to the dynamic market landscape. Ultimately, the comprehensive support offered by business incubators contributes to the establishment of sustainable enterprises, ensuring the long-term viability and success of startups emerging from these incubation programs. Then an important revelation emphasized in the paper is that the effectiveness of business incubators is positively impacted by elements like favorable university regulations like what (Gozali *et al.*, 2020) says.

Classification of Business Incubator Services Using a Satisfaction Matrix

Classification of business incubator services into different levels of satisfaction/dissatisfaction is carried out through a satisfaction matrix. The satisfaction matrix used is the IPA (Importance Performance Analysis) matrix and is seen from 75 public universities' startups.

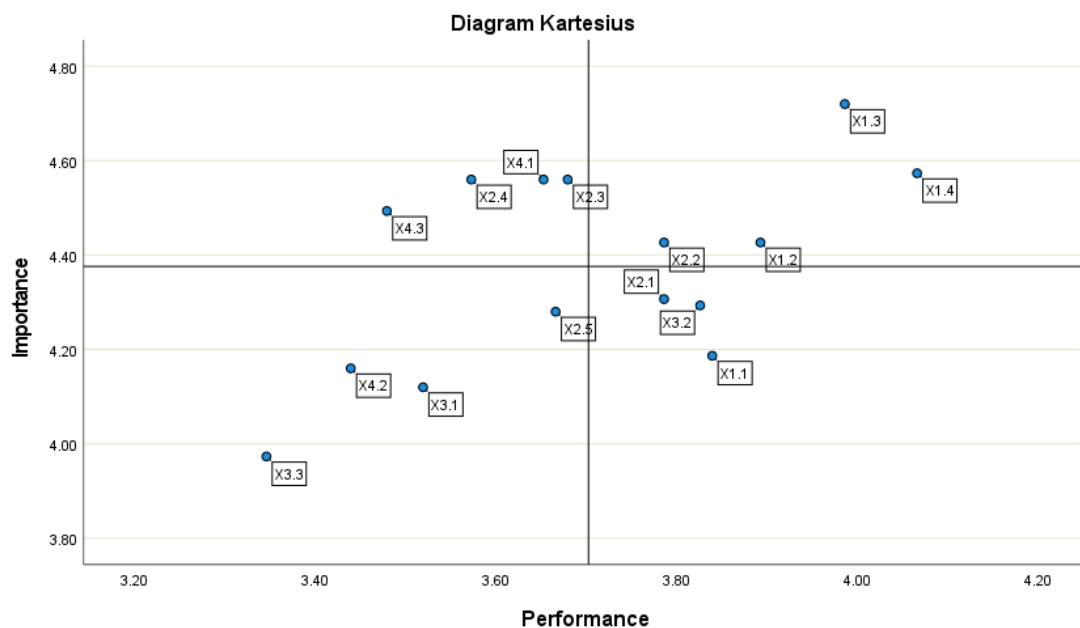


Figure 3. IPA (Importance Performance Analysis) Matrix

Figure 3 shows that the tenant satisfaction variable which is in Quadrant I (Concetrate Here) is X2.3: Business support [Legal support (IP protection and startup legal)], X2.4: Business support [Business networking (exhibitions and business matching with investors or potential partners)], X4.1: Service after graduation [Business network support after graduation], and X4.3: Services after graduation [Business expansion assistance]. The tenant satisfaction variable which is in Quadrant II (Keep Up the Good Work) is X1.2: [Facilities and infrastructure (Co-working space facilities)], X1.3: [Facilities and infrastructure (Internet facilities)], X1.4: [Facilities and infrastructure (Affordable or free rental fees)], and X2.2: [Business support (Business coaching and mentoring)]. The tenant satisfaction variable which is in Quadrant III (Low Priority) is X2.5: [Business support (Administrative support from the business incubator)], X3.1: [Financial support (Access financial institutions)], X3.3: [Financial

support (Capital participation and profit sharing)], and X4.2: [Service after graduation (Financial support after graduation)]. The tenant satisfaction variable which is in Quadrant IV (Possible Overkill) is X1.1: [Facilities and infrastructure (Complete office equipment and furniture)], X2.1: [Business support (Regular training and workshops)], and X3.2: [Financial support (Funding (grants or capital) from business incubators)].

Based on the IPA matrix, the tenant satisfaction variables that need to be considered are the variables in Quadrant I, namely X2.3: Business support [Legal support (IP protection and startup legal)], X2.4: Business support [Business networking (exhibitions and business matching with investors or potential partners)], X4.1: Service after graduation [Business network support after graduation], and X4.3: Services after graduation [Business expansion assistance]. This aligns with the findings of a study conducted by Atmoko (2021), which highlights the significance of business expansion for tenants. Following their involvement in the incubation program offered by the Business Incubator, the occupants experienced a notable surge in their business turnover, amounting to a substantial 30 percent growth within a span of one year. The tenants experienced an increase in the company's network following their participation in exhibitions and workshops.

Brands serve as a safeguard for new enterprises, enabling them to distinguish themselves from competitors, facilitate promotional efforts, ensure product or service quality, and convey information on the startup's origin. Patent protection is crucial for startup businesses to safeguard their technological advancements against potential infringement and misuse by external entities, thereby ensuring the interests and well-being of these entrepreneurial players. To secure brand and patent protection, it is necessary for entrepreneurs in new businesses to complete registration procedures with the Directorate General of Intellectual Property. This is because brands and patents adhere to a constitutive system (Sudaryat *et al.*, 2020).

According to Arini *et al.* (2018), empirical evidence suggests that workshops, expos, and exhibitions have a positive impact on tenant revenues. These events are further reinforced by training activities. The government also offers further support to small and medium-sized enterprises (SMEs) by offering possibilities for them to engage in exhibition activities, both domestically and internationally. In addition to this, small and medium-sized enterprises (SMEs) are also furnished with trade-related information, including details regarding trade opportunities, queries, trade missions, business matching, buyer lists, and other pertinent data (Sani & Madya, 2018).

During the post-incubation phase, once the tenant has successfully completed the business incubator program, they are expected to transition out of the incubator and establish an independent presence in order to foster business growth. This entails building a network of partnerships to facilitate further development. The incubator continues to offer communication and consulting services. During this phase, a co-incubation program was established, referred to as a collaborative initiative between business incubators operating across borders. The primary objective of this program was to provide assistance to tenants in their efforts to enter and expand into foreign markets (Purwadaria, 2011).

The results of the matrix can guide business incubators in prioritizing areas for enhancement and improvement, ultimately ensuring a more tailored and effective support system for startups. The approach acknowledges the multidimensional nature of incubator services and emphasizes the importance of aligning them with the evolving

needs and expectations of tenants for optimal satisfaction and success such what Pattanasak *et al.* (2022).

CONCLUSION

Based on the results and discussion, several things can be concluded, including: in terms of the performance efficiency of each business incubator, the level of job creation (average per year) surpasses the benchmarking value. This indicates that the business incubators within public universities have played a significant role in contributing to job creation. Additionally, the performance efficiency of each business incubator is evident in the high survival rates of startups nurtured within them, surpassing industry benchmarks. This resilience speaks to the effective support provided, ensuring the sustainability of businesses. Furthermore, the incubators have fostered a culture of innovation, as showcased by the introduction of novel products and services by startups. Their impact on the local economy is substantial, contributing to increased revenue generation and economic activity. The collaborative networks facilitated by the incubators have also enhanced market visibility and competitiveness for the startups, illustrating a holistic approach to performance efficiency. Overall, the business incubators within public universities demonstrate commendable efficiency across various metrics, emphasizing their pivotal role in fostering successful and resilient entrepreneurial ventures.

Regarding tenant satisfaction with the services offered by the business incubator, the findings reveal variations across all variables in terms of both effectiveness and importance levels. However, the average difference values indicate a negative trend, leading to the conclusion that tenants express dissatisfaction with the services provided by the business incubator. In evaluating tenant satisfaction with the services provided by the business incubator, the analysis indicates variations across effectiveness and importance levels for all variables. Despite these variations, the overall trend suggests a negative sentiment among tenants, as reflected in the average difference values. The conclusion drawn is that tenants generally express dissatisfaction with the services offered by the business incubator. This insight underscores the importance of addressing specific aspects of the services to enhance tenant satisfaction and optimize the overall effectiveness of the business incubator.

In the classification process utilizing the satisfaction matrix, areas demanding attention within business incubator services are identified. These include IP protection, startup legal assistance, exhibitions, and business matching with investors or potential partners. Furthermore, a focus on business network support post-graduation and assistance with business expansion is deemed crucial. The analysis underscores specific service areas that require enhancement to better align with the needs and expectations of tenants, emphasizing the importance of targeted improvements in these aspects to elevate overall satisfaction and effectiveness.

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