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Prioritizing Success Factors for the Performance of Sustainable Business Incubators: A Case Study of Andalas University

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Abstract: Studying the success factors of sustainability-focused business incubators is crucial because these incubators support startups that address environmental and social challenges, promoting sustainable development. Understanding these success factors enables incubators to provide targeted support that enhances the viability and impact of sustainable ventures. By optimizing the performance of sustainability incubators business will address global sustainability challenges and contribute to a more sustainable economy. This study aims to identify factors that support the success of a business incubator in a case study at Andalas University. This research used the Analytic Hierarchy Process (AHP) method, identifying ten factors with 49 subfactors supporting the incubator's success. Impact Factor (I) with a weight of 0.2349, Output (O) with a weight of 0.1978, and Resource Capacity (SD) with a weight of 0.1286 are the three main factors that determine the success of an incubator. The prioritized subfactors are Contribution to Regional Economic Growth (I2) with a weight of 0.1898, Technology and New Products (O3) with a weight of 0.0711, and Cooperation with Industry (EK1) with a weight of 0.0477. These factors are recommended because they are expected to support the success of the Andalas University Business Incubator.

Keywords: Business; Business incubator; Analytical Hierarchy Process (AHP); Success factors; Sub-factors; Sustainability

1. Introduction

However, the COVID-19 pandemic has forced some sectors to adapt: According to Yulianti et al. (2022), the development and adoption of technology in the corporate world have been going on for quite some time, but there are still many MSME players who have not utilized it optimally. Technology has the power to transform MSME marketing strategies, including marketing and interaction with customers, access to new markets, business partnerships, new product development (Fithri et al., 2022), and internal efficiency. When the pandemic hit, this changed instantly. Most entrepreneurs switched from offline to online marketing systems. However, others chose to replace their existing products with new products to raise additional capital. The survey was conducted from June 8 to 15, with 206 respondents from SMEs in Jakarta, Bogor, Depok, Tangerang, and Bekasi (Pusparisa, 2020). See Figure 1 for the results of the survey.

The survey also asked MSME participants how to get out of the crisis amid the current COVID-19 pandemic. As many as 34.6% of respondents said they had switched from an offline to an online marketing system. 15.4% of respondents choose to replace or create a new product or business with additional funds. Business is experiencing a shift to become digital, and people's mindsets and desires are very diverse. For this reason, business people must be able to adapt and adjust to these shifting conditions. In the business world, the change from the old order to a new one has quite a serious impact. Old companies are trying to survive by adapting to these conditions, but not

with the business model that is being carried out, while new companies are competing a lot to innovate and adapt to new business models.

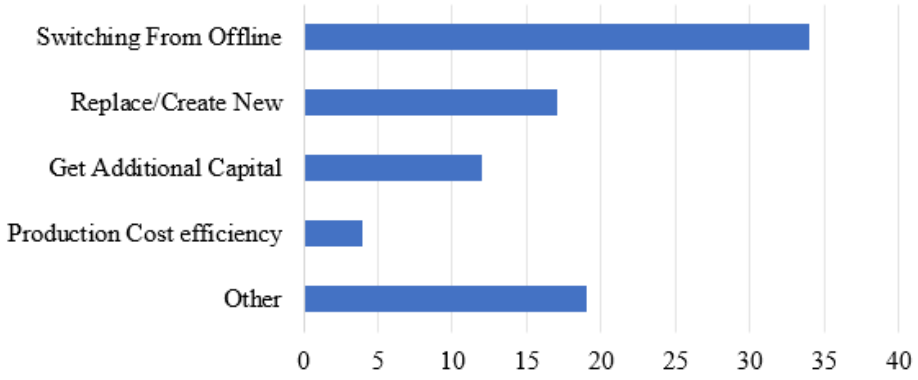

Figure 1. SME strategy table based on the survey
Source: Pusparisa (2020)

Given the current global conditions, including fierce business competition and the impacts of the COVID-19 pandemic, business owners need to implement better strategies and steps to adapt and ensure their businesses survive. To thrive, they must innovate flexibly and adjust to these shifting circumstances. Business incubators play a critical role in this adaptation process, particularly for companies just starting out or those facing development challenges. Business incubators help address fundamental issues such as lack of management skills (in marketing, production, and finance), inability to create marketable products, poor product packaging, and inadequate business planning. They provide necessary support through services like training, mentoring, business consulting, and access to capital. The Association of Indonesian Business Incubators (AIBI) is one of the entities that aid in this development, although current business incubators still face many challenges in optimally supporting tenants (Mahadewi et al., 2023).

One of the higher education incubators recorded by the Ministry of Research, Technology and Higher Education is the Technology Business Incubator (InBisTek) at STP Andalas University. Inbistek Unand, or the business incubator unit at Unand, is an institution that carries out business incubation activities, which are processes to support the development of business products from start-up/tenant businesses through training (coaching), mentoring, paperwork, coworking spaces, and others. so that it can become a company that earns more profit with standardized organizational and financial management, becomes a sustainable company, and ultimately has a positive impact on society. There are in-wall tenants and out-wall tenants who work closely with STP's Technology Business Incubator (InBisTek) (Azadnia et al., 2022).

The business incubator unit at Unand, in the success of its activities and programs, has many supporting factors. Based on an interview with the chairman of the Andalas University, Inbistek, based on new business research or new business products have a durability ratio of 1:9, symbolizing that if there are 10 new businesses at the beginning of the year, it is likely that at the end of the year only 1 business will remain. The percentage of people surviving this new business is only 10%. According to the Statistical Brain Research Institute, approximately half of all new enterprises experience failure within the initial five years of their establishment. The mortality rate for new businesses is very high because of a lack of knowledge about the business world. This is a situation that the business incubator wants to help by overcoming the death of a new business with various things that can be assisted in the development of this business. Business incubators can help reduce the death toll that occurs with many new businesses.

The importance of this business incubator is that it can provide assistance in terms of the effectiveness and efficiency of business work, as well as how to implement technology that can be applied as needed. Business incubators are also considered important for analyzing changes in the business incubator management model as well as the business and operational models of the incubated entrepreneurs themselves, and to see how the situation has affected the dynamics of entrepreneurship, how businesses have to adapt to this new situation, facing challenges such as digitalization needs, lack of funding, staff changes, regulatory measures, or perceptions of new opportunities that could become viable businesses (Rathore & Agrawal, 2020).

Studying the success factors of sustainability-focused business incubators is crucial because these incubators support startups that address environmental and social challenges, promoting sustainable development. Many previous studies have revealed factors that influence the performance of business incubators, including IT facilities, tenant assistance, financial support, government support and others (Gozali et.al., 2018; Lim & Kesumahati, 2023). Understanding these success factors enables incubators to provide targeted support that enhances the viability and impact of sustainable ventures. This study provides insights into effective strategies for promoting innovation,

optimizing resource allocation, and enhancing environmental and social benefits. Moreover, it serves to attract essential funding and policy backing necessary for expanding sustainable initiatives (Cohen & Winn, 2007; Schick et al., 2002). By optimizing the performance of sustainability incubators, we can better address global sustainability challenges and contribute to a more sustainable economy. This study aims to identify factors that support the success of a business incubator at Andalas University. This study chooses to use the AHP.

2. Methodology

The data is processed using the AHP method to obtain the desired weight so that priority factors can be determined to support the success of the business incubator at Andalas University and to be given recommendations on the priority factors supporting success. The following are the steps taken in data processing (Harjanto et al., 2021).

The first step is to identify the supporting factors for success. The stages of identifying the supporting factors for success are carried out by field surveys and direct interviews at the research site. The selected criteria are also based on references from research or journals that have been carried out so that they are appropriate and relevant to the factors needed (Fathoni et al., 2022).

The next step is to calculate the weight. The steps in determining the weight with the AHP method are as follows: Define the problem related to the factors supporting the success of business incubators and related literature about the factors supporting the success of business incubators. Create a decision structure and hierarchy from the start in the form of decision goals, then determine what factors support the success of the business incubator. Create a pairwise comparison matrix through a questionnaire that has been filled out by the expert. Paired scores will be assessed. Use the results of pairwise comparisons of the factors that support success to prioritize. Priority values are called local priorities for each level of the decision hierarchy, and are called global priorities for the synthesis of all priorities. The procedure for calculating priority is as follows: add up the values of each column in the pairwise comparison matrix. Divide the value of each matrix element by the sum of the columns for each column. Calculate the average value for each row as the priority value. Check the logical consistency of the priority based on the supporting factors of success. Determine the priority ranking based on the global weight obtained based on the previous stage, so that the desired final output is the priority of supporting factors for success. The next step is to determine recommendations. The steps taken to determine the recommendation are as follows: identify priority factors obtained based on previous AHP calculations (Kurnia et al., 2021).

Next-step analysis is carried out for the calculations obtained at the data processing stage (Gozali et al., 2020). Analysis is carried out on the weights obtained from the factors supporting the success of the business incubator, and analysis is also carried out to determine the significant factors that will support the success of the business incubator. Analysis is also carried out on recommendations for factors that support success, so that they can work and develop for the better.

3. Results

Identification of supporting factors for success was carried out using direct interviews and discussions and also based on references from several pieces of literature. Interviews were conducted with the Chair of STP, the Chair of Inbistek, the Coach of Inbistek, the Chair of UPT Entrepreneurship and economics lecturers who worked directly on the case study objects, namely Science Techno Park and UPT Entrepreneurship. After conducting direct interviews, factors can also be added based on references from research regarding business incubators. The factors obtained in supporting business incubators are 9 factors and 47 sub-factors, which are divided into them. Each factor will be assessed and given a weight so that the priority of each factor can be determined, which will later become the output of the research (Table A1).

After identifying the factors that support the success of the business incubator, there are 10 factors, and 49 sub-factors are under the factors that can be seen in the appendix. The study of success factors for sustainability business incubators encompasses various dimensions critical to their effectiveness. Key internal processes include idea validation mechanisms and innovation strategies, influenced by policy and market growth. Tangible assets, such as profits, tenant income, and infrastructure, are essential for operational success (Rukmana et al., 2023). Resource capability, highlighted by competent mentors, business planning quality, and skilled workers, directly impacts the incubator's performance. Long-term goals focus on tenant success, investment, and regional economic development. Program offerings like tenant selection, psychological support, and funding access are vital for nurturing startups. External relationships with industry, government, and universities bolster the incubator's network and resources. Operational factors, including costs, employee satisfaction, and managerial processes, ensure smooth functioning. Outputs like mature startups, new technologies, and workforce enhancement are measures of success. The impact on business value and regional economic growth highlights the broader benefits of incubators. Intangible assets, including legality, copyright, and reputation, contribute to sustained success and trust in the incubator's ecosystem.

AHP hierarchy structure can be attained from the factor and subfactor that identified, as listed in Table 1.

Table 1. AHP hierarchy structure

No	Factor	Sub Factor
1	Internal Process	Idea Validation Mechanism and Innovation Strategy
		Business Incubator Owner Institution Policy
		Tenant Market Growth
		Technology Base Incubation
		Technology & Information Development
		Profits and Tenant Income
		Occupancy Rate of Effect and Workspace form Tenant
2	Tangible Assets	Production Space
		Total Amount of Commercialized Research or Creation of Technology
		Land and Location
3	Resource Capability	HR & Management Organization
		Infrastructure
		Competent Mentors and Coaches
		Business Planning quality
		Quality of Invention in an Incubator
		Incubator Experieence
		Tenant Quality
4	Long Term Goals	Number of Skilled Workers
		Number of Successful Tenant
		Investation Amount
		Profit & Assets Growth
		Technology Transfer
		Tenant Sustainable Growth
		Job Creator
		Regional Economic Development
5	Program Offers	Tenant Selection Process
		Strengthening in Psychological Aspects
		Opportunities in Seeking Networking and Business Networks
		Strategy & Commercialization in Business
		Coaching and Mentoring in Business Skills
		Funding and Access to Funds and Industry Support
6	Eksternal Relationship	Cooperation with Industry
		Cooperation with Government
		Cooperation with Universities
7	Operational	Operation Costs for the Organization
		Fulltime Working in Incubator
		Employee Satisfaction
		Managerial Incubation Process
8	Incubator Output	Total Number of Startup that are mature and pass the incubation process
		The creation of scalable start up
		New Technology and Products
		worldforce Enchancement
9	Impact	Clients and Partners
		Business Value in a business incubator
		Contribution to growth to regional economic growth
10	Intangible Assets	Legality
		Copyright
		Trademark
		Reputation

The data came from questionnaires. The questionnaire is used to determine the priority weights of the supporting factors of success by comparing the weights in pairs. Questionnaires were distributed to experts who were directly related to business incubators at Andalas University and understood the AHP questionnaire. The following is data from respondents who are experts in the field of business incubators and assist in research, which can be seen in Table 2.

The AHP method is used to determine the priority of the factors and subfactors obtained by calculating the weight value of each factor and subfactor. To obtain weights, pairwise comparisons were carried out between factors obtained from the AHP questionnaire and then distributed to experts working in the business incubator field. The experts given for the AHP calculation this time are as many as 5 people, including the head of the Andalas University technology business incubator, the Chair of the Andalas University Science Techno Park (STP),

the Chair of the Entrepreneurship UPT, the Chair of the Technology Business Incubator (Inbistek), Andalas University Secretary and Incubator Coach Andalas University Technology Business, and an Experienced Faculty of Economics Lecturer in the Business Incubator at Andalas University. The first step in carrying out the AHP calculation is to calculate the pairwise comparisons between the criteria that have been given to the expert. This pairwise comparison value is later used to determine the final weight of AHP, which is used in determining the priority of factors and subfactors.

Table 2. Data of expert

No	Name	Age	Gender	Position
1	Berri Brilliant Albar, SE. MM.	37 Years Old	Male	Chairman of Inbistek (Technology Business Incubation) Andalas University
2	Dr. Eka Candra Lina, SP. M.Si	46 Years Old	Female	Head of Science Techno Park (STP) Andalas University
3	Dr. Oknovia Susanti, M.Eng.	49 Years Old	Female	Head of Entrepreneurship UPT Andalas University
4	Indah Maya Sari, SE. M.Si.	43 Years Old	Female	Coach and Member of Andalas University Inbistek (Technology Business Incubation).
5	Donard Games, SE, M.Bus(Adv), PhD.	42 Years Old	Male	Lecturer at the Faculty of Economics, Andalas University

The AHP is an extensively used decision-making tool that is particularly effective in dealing with complex problems involving multiple criteria (Qin et al., 2018). It is especially appropriate for our research question, which aims to determine the priority of factors and subfactors affecting business incubators. AHP provides a structured framework that systematically breaks down complex decisions into a hierarchy of more easily comprehended sub-problems, each of which can be analyzed independently. This hierarchical organization clarifies the relationships between criteria and sub-criteria, facilitating a more transparent decision-making process. The method uses pairwise comparisons to quantify the relative importance of each criterion and sub-criterion, allowing experts to provide their judgments in a manner that translates into numerical values, enabling the calculation of weights for each factor. Furthermore, AHP includes a consistency ratio (CR) to ensure that expert judgments are reliable. Involving experts with extensive knowledge and experience in the field of business incubation ensures that the factors and subfactors are evaluated based on informed judgments. Aggregating multiple expert opinions helps develop a consensus on the relative importance of different criteria, reducing individual biases and improving the robustness of the decision-making process (Habiburrahman et al., 2022). AHP is highly adaptable and applicable to various decision-making scenarios, making it suitable for evaluating the multifaceted aspects of business incubators. It allows for a comprehensive comparison between different criteria and subcriteria, making it easier to identify which factors significantly impact the effectiveness of business incubators. By calculating objective weight values, AHP facilitates the prioritization of factors, ensuring that decisions are well-informed, consistent, and aligned with expert knowledge. This quantitative approach ensures that the resulting weights are based on data-driven insights rather than subjective opinions alone, leading to more reliable and actionable conclusions. Given the complexity of evaluating business incubators and the need for a systematic, quantitative, and expert-driven approach, AHP is the most appropriate methodology for our study.

Calculations are performed for the first time to test the consistency of each expert. After obtaining pairwise comparison data for all experts, a consistency test was carried out to find out whether the assessments given were consistent or not. The consistency test has stages by calculating the weight of the criteria, followed by calculating the Weight Sum Factor (WSF), calculating the Consistency Factor (CF), maximum eigenvalue and Consistency Index (CI) until finally the CR is obtained.

Table 3. Matrix pair comparison factor for expert

	PI	AB	SD	T	P	EK	OP	O	I	ATB
PI	1	7	0.5	3	2	2	2	1	1	1
AB	0.143	1	0.2	0.25	0.333	0.333	0.333	0.25	0.333	1
SD	2	5	1	5	2	2	1	3	3	4
T	0.333	4	0.2	1	1	1	0.5	0.5	0.5	0.333
P	0.5	3	0.5	1	1	3	0.5	0.333	1	3
EK	0.5	3	0.5	1	0.333	1	0.333	0.333	0.333	2
OP	0.5	3	1	2	2	3	1	3	3	3
O	1	4	0.333	2	3	3	0.333	1	0.333	3
I	1	3	0.333	2	1	3	0.333	3	1	5
ATB	1	1	0.25	3	0.333	0.5	0.333	0.333	0.2	1
Total	7.976	34	4.816	20.25	12.999	18.833	6.665	12.749	10.699	23.333

After obtaining the pairwise comparison values that are made into the pairwise comparison matrices for each factor, then, normalization is carried out for each pairwise comparison matrix with the following equation (Table 3):

$$x_{ij} = \frac{x_{ij}}{\sum_{i=1}^{m} xij} \quad (1)$$

where,

x_{ij}: Values in columns i and j

m: Total of comparison criteria

All values from the normalization of this pairwise comparison matrix are 1. An example of a calculation can be seen as follows:

$$x_{ij} = \frac{1.000}{7.976} = 125$$

After that, the same process is carried out for each cell to be able to create a normalized matrix. After obtaining all the normalized matrices, proceed with determining the net weight by finding the average of the normalized matrices per row (Table 4).

Table 4. Matrix normalization factor for expert 1

	PI	AB	SD	T	P	EK	OP	O	I	ATB	Weight
Process Internal (PI)	0.125	0.206	0.104	0.148	0.154	0.106	0.300	0.078	0.093	0.043	0.136
Tangible Assets (AB)	0.018	0.029	0.042	0.012	0.026	0.018	0.050	0.020	0.031	0.043	0.029
Resource Capabilities (SD)	0.251	0.147	0.208	0.247	0.154	0.106	0.150	0.235	0.280	0.171	0.195
Long Terms Goals (T)	0.042	0,118	0.042	0.049	0.077	0.053	0.075	0.039	0.047	0.014	0.056
Program Offers (P)	0.063	0,088	0.104	0.049	0.077	0.159	0.075	0.026	0.093	0.129	0.086
Eksternal Relation (EK)	0.063	0,088	0.104	0.049	0.026	0.053	0.050	0.026	0.031	0.086	0.058
Operational (OP)	0.063	0,088	0.208	0.099	0.154	0.159	0.150	0.235	0.280	0.129	0.156
Incubator Output (O)	0.125	0,118	0.069	0.099	0.231	0.159	0.050	0.078	0.031	0.129	0.109
Impact (I)	0.125	0,088	0.069	0.099	0.077	0.159	0.050	0.235	0.093	0.214	0.121
Intangible Assets (ATB)	0.125	0,029	0.052	0.148	0.026	0.027	0.050	0.026	0.019	0.043	0.054

After obtaining the normalization matrix, the net weight is determined by calculating the average value of the normalization matrix. The net weight for each factor is calculated using the same method. The formula for calculating the net weight is as follows:

$$Net\ weight\ or\ \ Bj\ =\ \frac{\sum_{i=1}^{m} Xij}{m},\ or \quad (2)$$

$$Net\ weight\ or\ \ Bj\ =\ \frac{Sum\ of\ value\ of\ each\ row}{Total\ column\ on\ each\ row} \quad (3)$$

$$\text{Net Weight or } Bj\ =\ \frac{0.125+0.206+0.104+0.148+0.154+0.106+0.300+0.078+0.093+0.043}{10} = 0.136$$

$$WSFi = \sum_{i=1}^{m} (Xij, Bi) \quad (4)$$

$$WSFi = \begin{bmatrix} 1 & 7 & 0.5 & 3 & 2 & 2 & 2 & 1 & 1 & 1 \\ 0.143 & 1 & 0.2 & 0.25 & 0.33 & 0.33 & 0.33 & 0.250 & 0.33 & 1 \\ 2 & 5 & 1 & 5 & 2 & 2 & 1 & 3 & 3 & 4 \\ 0.33 & 4 & 0.2 & 1 & 1 & 1 & 0.5 & 0.5 & 0.5 & 0.33 \\ 0.5 & 3 & 0.5 & 1 & 1 & 3 & 0,5 & 0.33 & 1 & 3 \\ 0.5 & 3 & 0.5 & 1 & 0,33 & 1 & 0.33 & 0.33 & 0,33 & 2 \\ 0.5 & 3 & 1 & 2 & 2 & 3 & 1 & 3 & 3 & 3 \\ 1 & 4 & 0.33 & 2 & 3 & 3 & 0.33 & 1 & 0.33 & 3 \\ 1 & 3 & 0.33 & 2 & 1 & 3 & 0.33 & 3 & 1 & 5 \\ 1 & 1 & 0.25 & 3 & 0.33 & 0.5 & 0.33 & 0.33 & 0.2 & 1 \end{bmatrix} \times \begin{bmatrix} 0.136 \\ 0.029 \\ 0.195 \\ 0.056 \\ 0.086 \\ 0.058 \\ 0.156 \\ 0.109 \\ 0.121 \\ 0.054 \end{bmatrix} = \begin{bmatrix} 1.487 \\ 0.323 \\ 2.241 \\ 0.610 \\ 0.966 \\ 0.632 \\ 1.816 \\ 1.224 \\ 1.430 \\ 0.605 \end{bmatrix}$$

After obtaining the net weight, we can then determine the consistency of the ratio for each expert with the stages of using the WSF. To calculate the ratio consistency value, the WSF is first calculated by multiplying the pairwise comparison matrix in Table 4 with the net weight obtained in each row.

After the WSF value is obtained, the CF is calculated. The consistency of this factor is derived from the WSF comparison matrix divided by the net weight of each row. The calculations for the CF are as follows:

$$CFi = \frac{WSFi}{Bi}, \text{ or } \frac{\text{WSF matrix}}{\text{Net weight of each row}} \tag{5}$$

$$Fi = \begin{bmatrix} 1.487/0.136 \\ 0.323/0.029 \\ 2.241/0.195 \\ 0.610/0.056 \\ 0.966/0.086 \\ 0.632/0.058 \\ 1.816/0.156 \\ 1.224/0.109 \\ 1.430/0.121 \\ 0.605/0.054 \end{bmatrix}$$

$$CFi = \begin{bmatrix} 10.949 \\ 11.220 \\ 11.494 \\ 10.987 \\ 11.182 \\ 10.966 \\ 11.605 \\ 11.236 \\ 11.809 \\ 11.102 \end{bmatrix}$$

After obtaining the CF from the comparison matrix, the next step involves calculating the average entry (eigenvalue), which will subsequently be used to calculate the CI.

$$\text{Eigen value } (\lambda_{max}) = \frac{\sum_{i=1}^{m} \text{CFi}}{m} \tag{6}$$

$$\text{Eigen value } (\lambda_{max}) = \frac{(10.949+11.22+11.494+10.987+11.182+10.966+11.605+11236+11.809+11.102)}{10} = 11.255$$

After obtaining the eigenvalue (λmax), the next step is to calculate the CI, and the calculation methods are given below:

$$\text{CI} = \frac{\lambda_{\text{max - m}}}{\text{m-1}} \tag{7}$$

$$\text{CI} = \frac{11.255\text{-}10}{10\text{-}1} = \frac{1.255}{9} = 0.1394$$

If the calculated value for the CI has been obtained, then the CR calculation is then carried out, which shows that the value given by the respondent is consistent. If the value of the CR is small or equal to 0.1, it is said that the value given by the respondent is consistent. To calculate the CR value, a random index is used, which is based on the number of n values or the number of factors.

$\text{CR} = \frac{\text{Consistency Index}}{\text{Random Index}}$, where the random index n = 10 is 1.49.

$$\text{CR} = \frac{0.1394}{1.49} = 0.0936$$

The value of the CR is smaller than 0.1, specifically 0.0936 < 0.1, indicating that the values provided by expert 1 are consistent. Therefore, the pairwise comparison matrix values for expert 1 can be utilized to calculate the overall weight. Once the weight is calculated and confirmed consistent, the geometric mean of the weights from

all five experts should be calculated. The same calculations performed for expert 1 should be applied to the data from the other experts until the final consistent weight is obtained.

Calculations were performed using the AHP method and the results are shown in Table 5 below.

Table 5. Final factor and weight recapitulation

Factor	Final Weight Value	Subfactor	Weight	Total Final Weight
Process Internal (PI)	0.0874	IN1	0.1263	0.0110
		IN2	0.1903	0.0166
		IN3	0.2823	0.0247
		IN4	0.2870	0.0251
		IN5	0.1140	0.0100
Tangible Assets (AB)	0.0382	AB1	0.2373	0.0091
		AB2	0.0442	0.0017
		AB3	0.0817	0.0031
		AB4	0.1222	0.0047
		AB5	0.0835	0.0032
		AB6	0.2905	0.0111
		AB7	0.1406	0.0054
Resource Capabilities (SD)	0.1286	SD1	0.1787	0.0230
		SD2	0.1821	0.0234
		SD3	0.1298	0.0167
		SD4	0.1832	0.0236
		SD5	0.1626	0.0209
		SD6	0.1637	0.0210
Long Terms Goals (T)	0.0690	T1	0.0772	0.0053
		T2	0.1351	0.0093
		T3	0.1764	0.0122
		T4	0.0853	0.0059
		T5	0.2247	0.0155
		T6	0.1426	0.0098
		T7	0.1587	0.0109
Program Offers (P)	0.0562	P1	0.0536	0.0030
		P2	0.0689	0.0039
		P3	0.1324	0.0074
		P4	0.2708	0.0152
		P5	0.2492	0.0140
		P6	0.1731	0.0097
Eksternal Relation (EK)	0.0744	EK1	0.6412	0.0477
		EK2	0.0965	0.0072
		EK3	0.2623	0.0195
Operational (OP)	0.0559	OP1	0.2084	0.0117
		OP2	0.3617	0.0202
		OP3	0.1662	0.0093
		OP4	0.2637	0.0148
Incubator Output (O)	0.1978	O1	0.1332	0.0263
		O2	0.1855	0.0367
		O3	0.3595	0.0711
		O4	0.1901	0.0376
		O5	0.1317	0.0260
Impact (I)	0.2349	I1	0.1919	0.0451
		I2	0.8081	0.1898
Intangible Assets (ATB)	0.0575	ATB1	0.2501	0.0144
		ATB2	0.2555	0.01477
		ATB3	0.2552	0.0147
		ATB4	0.2393	0.0138

Table 5 above provides an overview of the weighted values of various factors and subfactors that influence the effectiveness of an incubator. These factors consist of various aspects that are important for the success and impact of a business incubation program. Internal Process (PI) factors are the incubator's internal operational processes, including innovation processes and internal management policies. Tangible Assets (AB) evaluates the material resources available to the incubator, such as facilities and equipment, which play an important role in supporting startups. Resource Capabilities (SD) assesses an incubator's ability to manage and utilize resources effectively,

which is important for maintaining operations and supporting startups. Long-term goals (T) concern the clarity and direction of the incubator's long-term goals, which determine its strategic direction and focus. Program Offerings (P) discusses about the diversity and quality of programs offered by the incubator, which is very crucial to support the growth and development of startups. External Relations (EK) is an assessment of the strength of the incubator's external partnerships and collaborations, which can increase resources and opportunities for startups. Operations (OP) evaluates the efficiency and effectiveness of operational processes in the incubator, thereby ensuring smooth operations and risk management. Incubator Output (O) measures the overall performance and success of the incubator, including metrics such as the number of successful startups and the resulting economic impact. Impact (I) is the assessment of social and economic impacts and reflects their contribution to employment, creation, diffusion of innovation and economic development. Intangible assets (ATB) consist of intangible assets such as intellectual property and reputation that contribute to the overall value and competitiveness of the incubator. These factors and sub-actors provide valuable insight into the incubator's strengths and areas of development, guiding efforts to improve its performance and maximize its positive impact on the startup ecosystem.

4. Discussion

From all these factors and sub-factors, the final weight for the prioritized factor is obtained. The most influential factor is Impact (I) with a weight of 0.2349, followed by the incubator output factor (O) with a weight of 0.1978 and the Resource Capability (SD) with a weight of 0.1286. For the most influential subfactor, namely the contribution to regional economic growth (I2), it has the highest weight of 0.1898. Henceforth, new technology and products (O3) with a weight of 0.0711, and Cooperation with industry (EK1) with a weight of 0.0477. The graphs of factors and subfactors can be seen in Figure 2 and Figure 3 below.

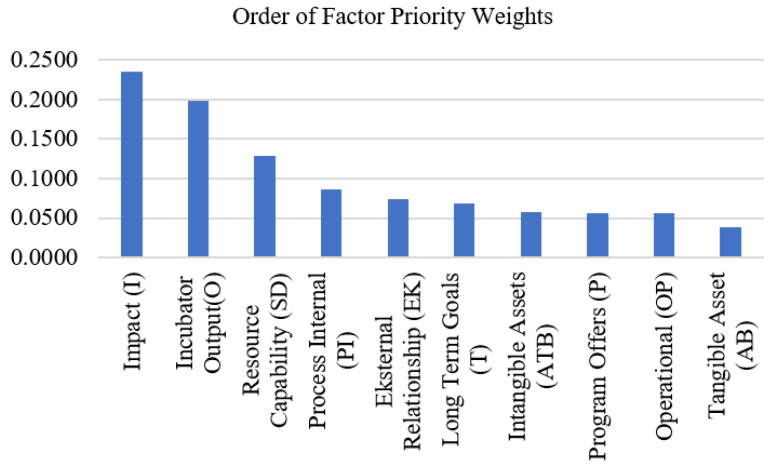

Figure 2. Priority factors supporting the success of a business incubator

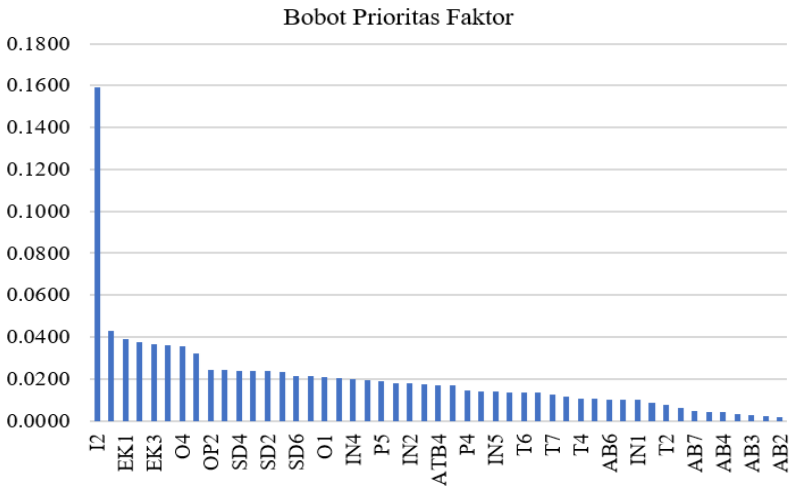

Figure 3. Priority subfactors supporting the success of a business incubator

After determining the priority of all identified factors, the next step involves selecting several key factors for evaluation and providing corresponding recommendations. Recommendations are made based on factors and sub-factors that rank above the average in terms of priority. These recommendations are intended to support the development and success of the business incubator at Andalas University, ensuring they are clear and actionable.

Recommendations are formulated by considering the priority factors that significantly influence the success of a business incubator. In this study, recommendations were developed through direct interviews with the business incubator. These recommendations focus on several priority sub-factors and are intended to guide the formulation of effective strategies. The following recommendations were derived from the interviews and are detailed below:

Table 6. Recommended business incubator success factor

Code	Factors	Weight	Recommendation
I2	Contribution to Regional Economic Growth	0.98	Multiply and disseminate information to MSMEs, especially those in the West Sumatra area to be able to collaborate with business incubators in West Sumatra, both for students and the community so that later it can have an impact on economic growth and business value in the region and Indonesia
O3	New Technologies and Products	0.711	Utilizing new technologies and products that have been created to be used by the development of business incubators
EK1	Cooperation with Industry	0.477	Helping new tenants to establish communication and collaboration with regional industries that can assist in the development of the tenants concerned Establish cooperation with relevant stakeholders in the development of incubators

Based on Table 6, the Business Incubator Success Factors emphasize the importance of focusing on new technology utilization and product development within the business incubators. Additionally, it is crucial for the Business Incubator to assist new tenants in establishing relationships with industry partners.

5. Conclusions

The conclusion from this research identifies 10 factors and 49 sub-factors contributing to the success of a business incubator's sustainability. Among these, three factors and their corresponding sub-factors are found to be the most influential: the impact factor with a weight of 0.2349, the incubator output factor (O) with a weight of 0.1978, and resource capability (SD) with a weight of 0.1286. The least influential factor has a weight of 0.034. For the priority sub-factors, after calculating the final weight, the contribution to regional economic growth (I2) is the highest with a weight of 0.1898. This is followed by new technology and products (O3) with a weight of 0.0711 and collaboration with industry (EK1) with a weight of 0.0477. The sub-factor with the least influence is the office occupancy rate and tenant workspace (AB2) with a weight of 0.0017.

The practical implications obtained from this research are increasing and disseminating information to MSMEs, especially those in the West Sumatra area, to be able to collaborate with business incubators in West Sumatra, both for students and the community, so that later it can have an impact on economic growth and business value. in the regions and Indonesia. Utilizing new technology and products that have been created, so that they can be used in the development of the business incubator. Helping new tenants establish communication and collaboration with regional industries that can assist in the development of the tenants concerned. Establishing collaboration with relevant stakeholders in incubator development. Supporting movements carried out by business incubators and supporting the birth and development of tenants. Recruiting full-time managers who can support business incubator success.

Meanwhile, the theoretical implication is to provide appropriate strategies for factors and sub-factors, including increased socialization of pre-incubation activities, socialization of the importance of business incubators, tenant selection, implementation of training, product development, production processes, product standardization, commercialization, access to capital, legality, and expansion markets. The advice given for further research is to implement and re-measure the success and sustainability of a business incubator.

This research has some limitations, and the first was the use of only five experts from Andalas University, which shows it was not conducted for generalizability. Future research should consider including more participants and/or utilizing a combined research method that incorporates a quantitative approach. Secondly, the AHP method, not only the AHP the AHP method, can analyze this case. Therefore, some alternative methods, such as the Analytic Network Process method, should be considered in future studies. Thirdly, we recommend conducting comparisons with other incubators in Indonesia for future studies, and finally, we suggest using the three propositions suggested in this study as the basis for future research.

Data Availability

The data used to support the research findings are available from the corresponding author upon.

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Conflicts of Interest

The authors declare no conflict of interest.

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Appendix

Table A1. Factors and subfactors success of business incubator performance

No	Factor	Sub Factor	Reference
1	Internal Process	Idea Validation Mechanism and Innovation Strategy	Prasetio et al. (2019)
		Business Incubator owner Institution Policy	KOMINFO (2021)
		Tenant Market Growth	Gozali et al. (2016)
		Technology Base Incubation	Etringer & Da Silva (2020)
		Technology & Information Development	Etringer & Da Silva (2020)
		Profits And Tenant Income	Prasetio et al. (2019)
		Occupancy rate of effect and workspace form tenant	Prasetio et al. (2019)
2	Tangible Assets	Production Space	Expert Recommendation
		Total amount of commercialized reseratch or creation of technology	Prasetio et al. (2019)
		Land and Location	Etringer & Da Silva (2020)
		HR & Management Organization	Prasetio et al. (2019)
		Infrastructure	Etringer & Da Silva (2020)
3	Resource Capability	Competent mentors and Coaches	Expert Recommendation
		Business Planning quality	Expert Recommendation
		Quality of invention in an incubator	Expert Recommendation
		Incubator Experieence	Expert Recommendation
		Tenant Quality	Verma (2004)
4	Long Term Goals	Number of Skilled Workers	Expert Recommendation
		Number of Successful Tenant	Prasetio et al. (2019)
		Investation Amount	Prasetio et al. (2019)
		Profit & Assets Growth	Prasetio et al. (2019)
		Technology Transfer	Etringer & Da Silva (2020)
		Tenant Sustainable Growth	Prasetio et al. (2019)
		Job Creator	Prasetio et al. (2019)
		Regional Economic Development	Prasetio et al. (2019)
5	Program Offers	Tenant Selection Process	Prasetio et al. (2019)
		Strengthening in Psychological Aspects	Expert Recommendation
		Oppurtunities in seeking networking and business networks	Gozali et al. (2016)
		Strategy & commercialization in business	Expert Recommendation
		Coaching and mentoring in business skills	Prasetio et al. (2019)
6	Eksternal Relationship	Funding and access to funds and industry support	Gozali et al. (2016)
		Cooperation with industry	Prasetio et al. (2019)
		Cooperation with government	Prasetio et al. (2019)
		Cooperation with Universities	Prasetio et al. (2019)
7	Operational	Operation Costs for the organization	Prasetio et al. (2019)
		Fulltime working in incubator	Expert Recommendation
		Employee satisfaction	Prasetio et al. (2019)
		Managerial Incubation Process	Prasetio et al. (2019)
8	Incubator Output	Total Number of Startup that are mature and pass the incubation process	Prasetio et al. (2019)

9	Impact	The creation of scalable start up	Expert Recommendation
		New Technology and Products	Keshtegar & Rahimi (2015)
		worldforce Enchancement	Expert Recommendation
		Business Value in a business incubator	Etringer & Da Silva (2020)
		Contribution to growth to regional economic growth	Etringer & Da Silva (2020)
10	Intangible Assets	Legality	Expert Recommendation
		Copyright	Expert Recommendation
		Trademark	Expert Recommendation
		Reputation	Prasetio et al. (2019)